



Management strategy of invasive plants - Study cases with three species -



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Invasive plants in Belgium

ISEIA Index



Guidelines :

Invasion level

(Branquart *et al.*, 2007)



National scale



Strategy

> **Attenuation**

> **Containment**

> **Eradication**

> **Prevention**

Guidelines :

Local scale



Eradication

Guidelines :

Local scale



Containment

Guidelines :

Local scale



Attenuation

Management techniques :

Manual



Mechanical



Chemical



Which techniques ?

It depends on :

- The habitat type invaded



Riverbanks



Rocky slopes

...

- The plant morphology (stems, roots, etc.)



Ligneous



Herbaceous

...

- The reproduction mode



Sexual



Vegetative

Methodology

Step 1 : Preparatory phase

Bibliographical review

doi:10.1007/s11336-011-9211-4
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 M. S. W. PAPPE

We can eliminate invasions or live with them.
 Successful management projects

David Stachowicz

The Giant Hogweed Best Practice Manual Guidelines for the management and control of an invasive weed in Europe

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Abstract *Heracleum mantegazzianum* is a highly invasive species, a significant low diversity risk species, but it is also an invasive species, a native herb, and a management technique for low diversity for long period control. This manual, written using mechanical, physical, chemical, biological, and other methods, provides a review of herbicide and other control methods, and discusses the possibility of control of this species.

Keywords Biological control



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Experimental study of vegetative regeneration in four invasive *Reynoutria* taxa (Polygonaceae)

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Key words: Clonal growth, Czech Republic, *Fallopia*, Hybridization, Rhizome nodes, Shoot emergence, Stem fate

Abstract

Garden experiments focused on vegetative regeneration were carried out with four invasive taxa of the genus *Reynoutria* (*R. japonica* var. *japonica*, *R. japonica* var. *compacta*, *R. sachalinensis* and a hybrid between *R. sachalinensis* and *R. japonica* var. *japonica*, *R. schobingeri*). Regeneration ability of stems and rhizomes, timing of shoot emergence and biomass production were studied under the following treatments: laid horizontally on the soil surface, placed upright, buried in the soil, floating in water. Two different soils (sand and garden loam) representing contrasting nutrient levels were applied. Differences were found in the capability and speed of regeneration, as well as in the quality of shoots produced. Regeneration from stems was less efficient than that from rhizomes in all taxa except *R. sachalinensis*. *R. schobingeri* exhibits higher regeneration potential (97%) than all other taxa and can be considered as the most successful taxon of the Czech representatives of the genus *Reynoutria* in terms of regeneration and establishment of new shoots. High regeneration capacity was also exhibited by *R. japonica* var. *compacta* (52%). Other taxa showed generally lower regeneration rates (*R. japonica* var. *japonica* 10% and *R. sachalinensis* 27%), but under some treatments the percentage of regenerated segments was high. In *R. japonica* var. *japonica* rhizomes regenerated successfully in all three soil treatments but not in the water. An opposite pattern was found for its stems: they regenerated well if exposed to water treatment but in the soil, they did not regenerate at all. Particular taxa responded to the soil type in a contrasting way: *R. sachalinensis* and *R. schobingeri* regenerated better in loam while the opposite was true in *R. japonica* var. *japonica*, *R. japonica* var. *compacta* produced the tallest and *R. schobingeri* the heaviest and most robust stems. It is concluded that rhizomes are more crucial than stems for the spread of knotweeds through fragmentation and clonal growth, supporting the importance of soil disturbance.

Introduction

Asexual reproduction (apoptosis) is less frequent in plants than the sexual mode (allopatry), the main advantage of the latter being its generating higher genetic variation (Crawley 1997). Apoptosis is usually divided into (i) vegetative and (ii) clonal reproduction, which both produce genetically identical progeny. The former is a typical feature of many species of Asteraceae and Rosaceae, and can be observed easily on localized extremely successful ecotypes in

specific habitats (e.g. high mountains, salt marshes, etc.) (Crawley 1997). Clonal growth results in the production of genetically identical descendants (ramets) with the potential to become independent of the mother organism (Kilmer et al. 1997). Clonality is usually understood as an adaptation to highly heterogeneous environments (Silvertown 1986; Smeaton et al. 1994; White 1994) and is very common in the Central European flora (Kilmer et al. 1997).

High proportion of invasive plants possess apomixis adapted to asexual clonal dispersal (Wag-

Field expertise



Contact with managers



Methodology

Step 2 : Tests implementation

Selection :

Study site

Management
technique

Management :

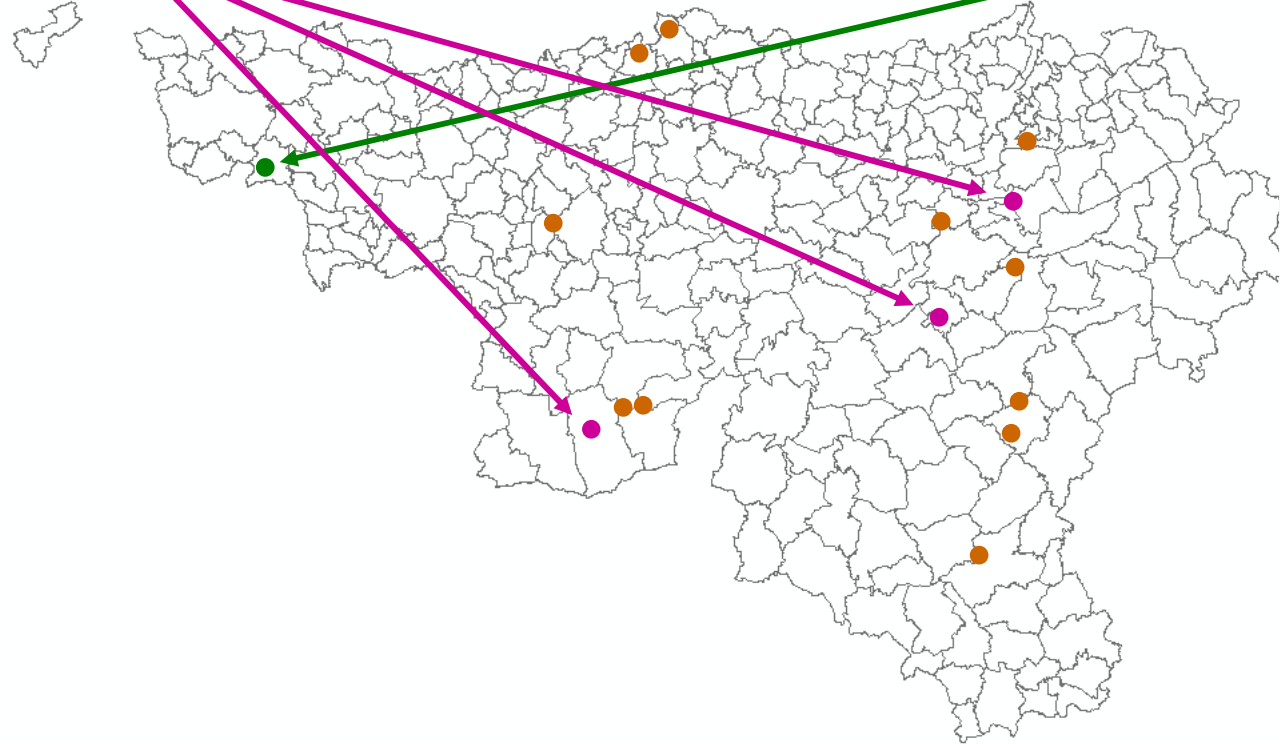
Duration

Monitoring

*I.
alandulifera*

Fallopia spp.

A. rufinerve



Methodology

Step 2 : Tests implementation

***I.
glandulifera***

Fallopia spp.

A. rufinerve

Selection :

Study site

6

2

1

Management
technique

Manual pulling
out
Cutting

Cutting
Cutting with
plantations,
with or without
tarpaulin
Pulverisation,
injection

Cutting
Manual pulling out
Mechanical pulling
out

Management :

Duration

3 years

3 years

15 months

Monitoring

Assessment of efficiency, costs and output



Himalayan balsam

- *Impatiens glandulifera* -



© S. Vanderhoeven



© S. Vanderhoeven

- **Herbaceous, annual**

- **Widespread in Belgium**

- **Habitat preference :
riverbanks**



© L. Saad

Himalayan balsam – Management tests



- Time consuming but technically easy
- Techniques : cutting and/or pulling out
- Period : mid June – mid July
- Management frequency : 3 times / year

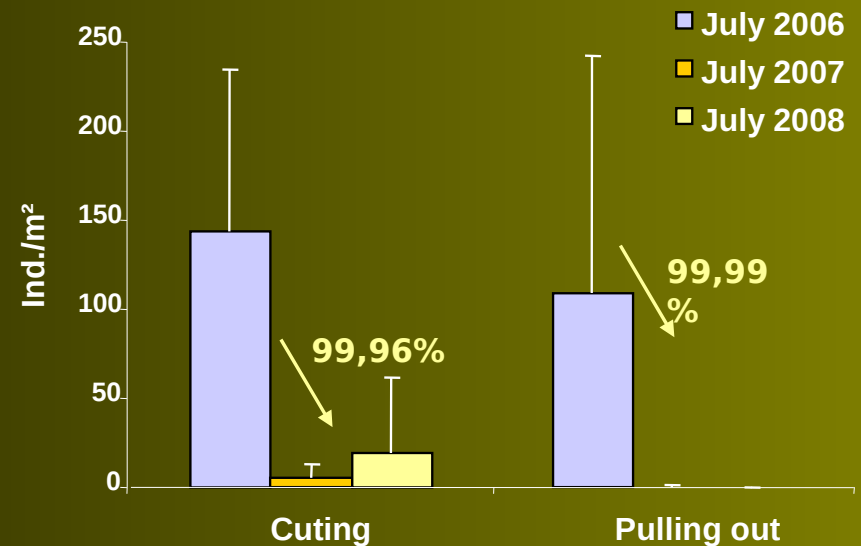


Himalayan balsam – Management tests



Efficiency

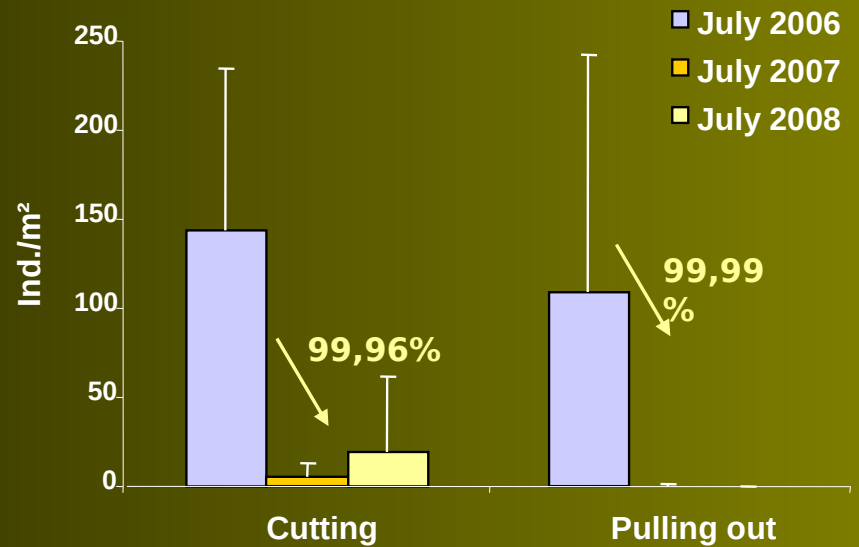
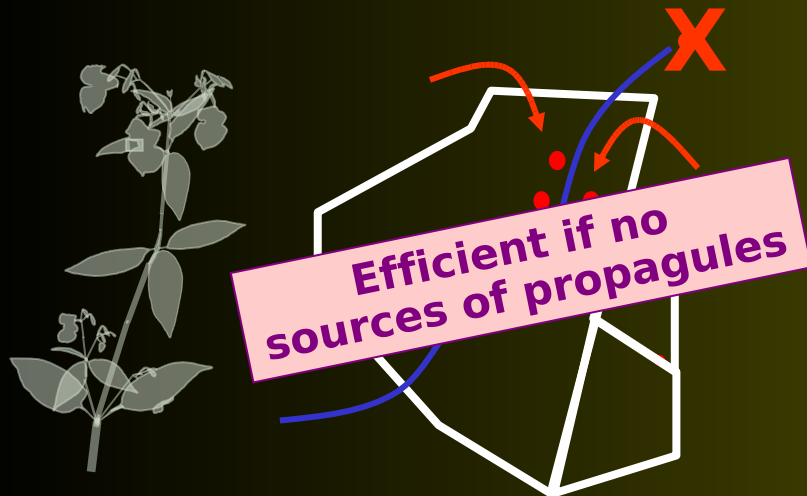
- Time consuming but technically easy
- Techniques : cutting and/or pulling out
- Period : mid June – mid July
- Management frequency : 3/year



Himalayan balsam – Management tests



Efficiency





Japanese knotweed

- *Fallopia japonica* -



- Herbaceous

- Rhizomateous

- Widespread in Belgium

- Habitat preference : disturbed soils



Japanese knotweed (*Fallopia japonica*) – Management tests

Geotextile + herbs seedling



Cutting



Tree plantations



Thermic treatment



Willow cuttings + biomulch

Japanese knotweed (*Fallopia japonica*) – Management

tests

Ex : Repeated cutting combined with plantations (*Salix viminalis*)

2006



Cutting *Fallopia* stems from July to October



Planting



Cutting *Fallopia* regrowths



09/2007

Japanese knotweed (*Fallopia japonica*) – Management tests

Ex : Repeated cutting combined with plantations (*Salix viminalis*)

2006



Cutting *Fallopia* stems from July to October



Plantation

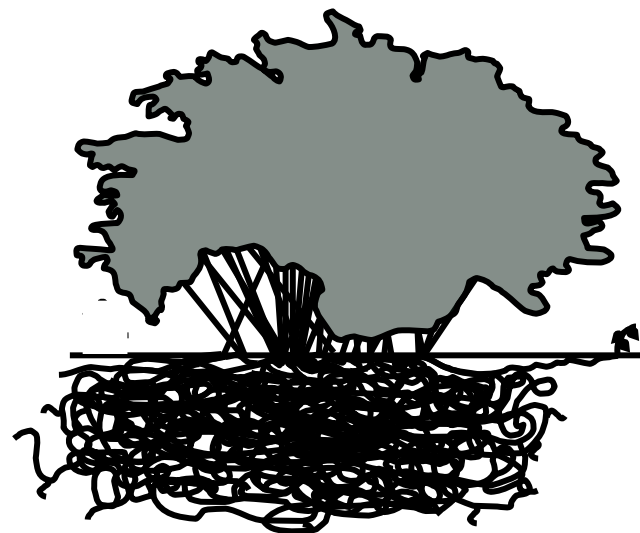
Conclusions :

- Time consuming

Very difficult to eradicate with mechanical methods

... chemical tests in progress ...

... still active underground





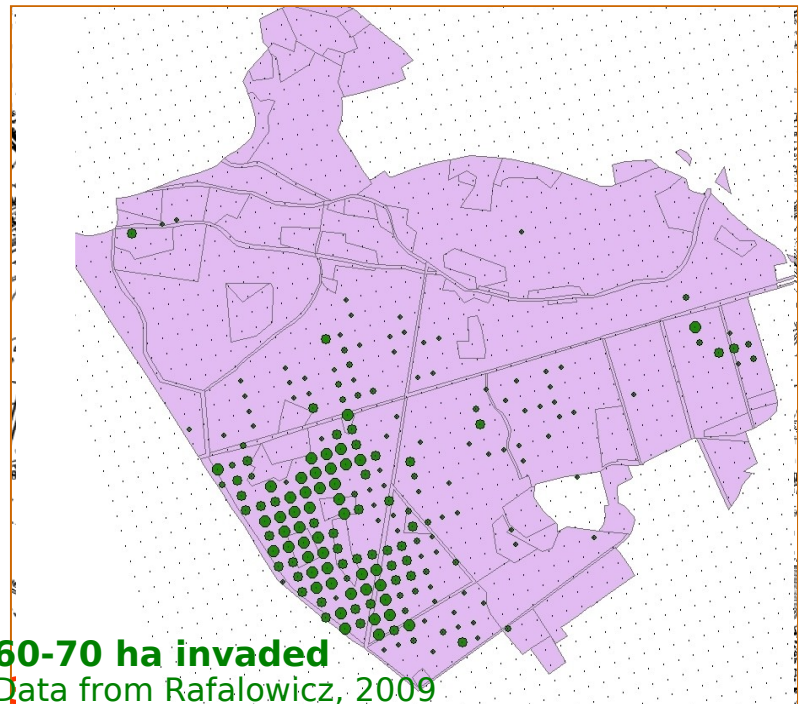
Red veined maple

- *Acer rufinerve* -



DESCRIPTION

- Tree native from Japan
- Voluntary planted
- Population expansion
- Re-sprouting ability
- High survival rate after cutting





**Mechanical cutting
3 replicates**



**Manual pulling out
3 replicates**



**Mechanical pulling out
3 replicates**

Before management

After management



Before management

After management



... Assessment in progress ...

Monitoring

Where is the information ?

FUSAGx-Labo d'Ecologie - Windows Internet Explorer

http://www.fsagx.ac.be/ec/gestioninvasives/pages/accueil.htm

http://www.fsagx.ac.be/ec/gestioninvasives/pages/accueil.htm

FUSAGx-Labo d'Ecologie

FUSAGx-Ecologie FUSAGx-Ecologie

Cellule d'appui à la gestion des plantes invasives

Bienvenue ...

Bienvenue sur le site de la **Convention Service public de Wallonie-Direction des Cours d'eau non navigables: "Mise en place d'une cellule d'appui à la gestion des espèces de plantes invasives le long des cours d'eau non navigables en Région wallonne"**.

Ce site a pour objectifs de répondre aux questions suivantes:

- 1) Qu'est-ce qu'une plante invasive?
- 2) Quelles sont les plantes invasives principales?
- 3) Que doit-on faire ou ne pas faire?
- 4) Quel est notre travail?
- 5) Qui contacter?
- 6) Où trouver de l'information?

Bonne visite!

Qui sommes-nous?
Qu'est-ce qu'une plante invasive?
Documents disponibles
Liens utiles
Renseignements

Accueil
Crédits

Terminé

démarrer 2 Microsoft Power... 3 Explorateur Win... 2 Internet Explorer Eudora - [Réception] FR 10:24

Where is the information ?

The screenshot shows a Windows Internet Explorer browser window displaying a website. The address bar shows the URL: <http://www.fsagx.ac.be/ec/gestioninvasives/pages/Doc-dispo.htm>. The website content is as follows:

- Documents réalisés**
- Les guides**
 - Guide de reconnaissance des principales plantes invasives le long et dans les cours d'eau et étangs: **VERSION FINALE (07/07/2007)**. Un guide illustré facile d'utilisation
 - Guide de gestion des principales espèces de plantes invasives: **Version TEST protégée.**
 - Fiches de reconnaissance et de gestion synthétiques:
 - *I. glandulifera*
 - *H. mantegazzianum*
 - Glossaire général: pour utiliser les guides.
- Les fiches descriptives**
- Espèces concernées par le projet**
[En PDF... cliquez]
 - *Heracleum mantegazzianum*
 - *Impatiens glandulifera*
 - *Fallopia spp.*
- Autres espèces**
[En PDF... cliquez]
 - *Aster spp.*
 - *Azolla filiculoides*

Red annotations on the page include:

- A red oval around the first two items in the "Les guides" section.
- A red oval around the "Fiches de reconnaissance et de gestion synthétiques" section.
- A red oval around the "Les fiches descriptives" section.

Red callout boxes with white text are placed over the page:

- "Identification guide" points to the first guide.
- "Management guide" points to the second guide.
- "Descriptive sheets" points to the "Les fiches descriptives" section.

The browser's taskbar at the bottom shows several open applications: "2 Microsoft Power...", "3 Explorateur Win...", "2 Internet Explorer", and "Eudora - [Réception]". The system clock shows 10:32.



...Thanks for your attention...

