La renouée japonaise

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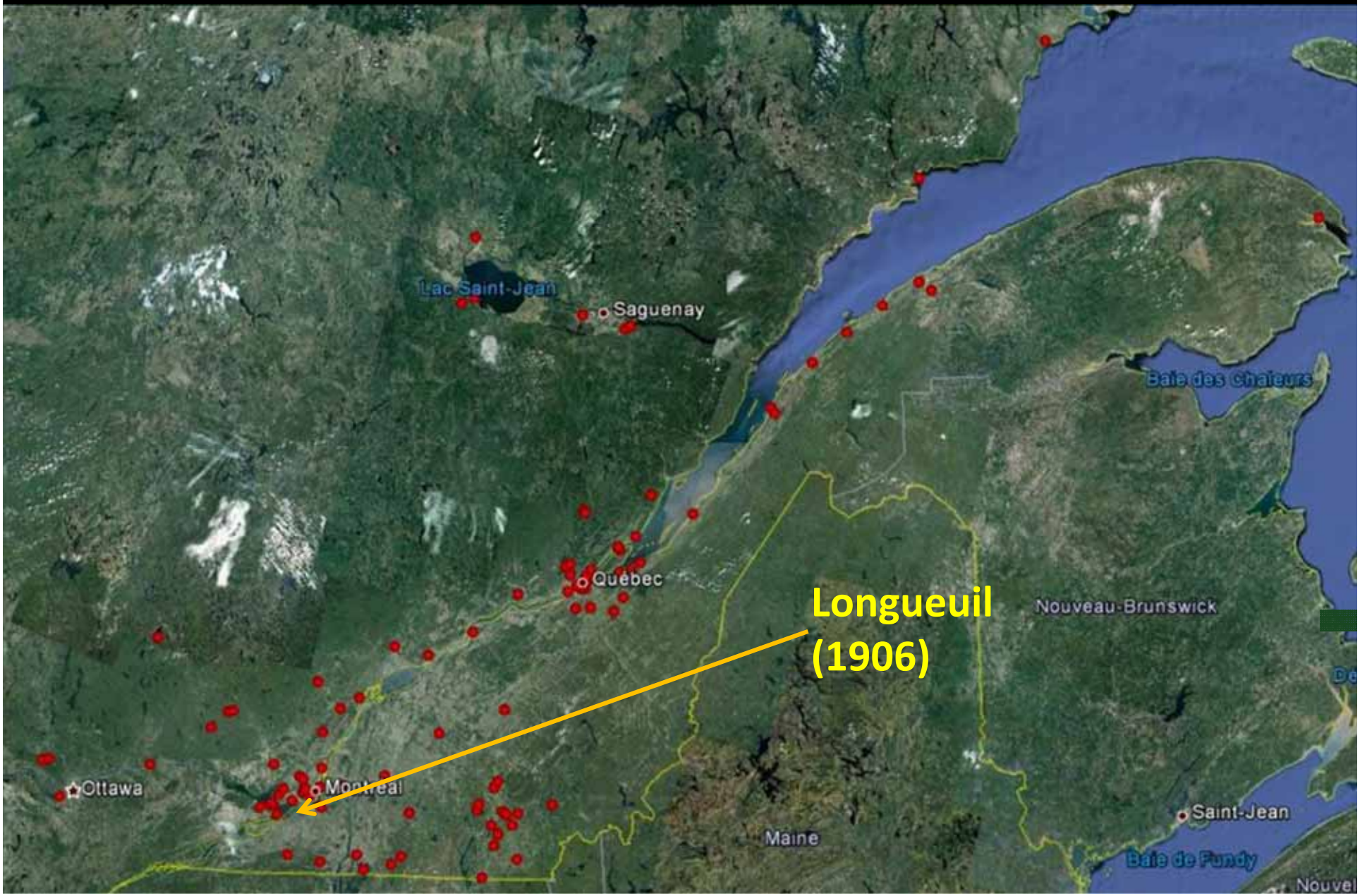
Renouée japonaise ou « bambou »
Fallopia japonica var. japonica

Spécimens d'herbier (Québec)




Japanese
Knotweed
tangy, similar to rhubarb
eat raw or cooked in
sweet or savory dishes


SOLARAY
DIETARY SUPPLEMENT
Guaranteed Potency
Resveratrol
JAPANESE KNOTWEED, 75
40% TOTAL RESVERATROL
60 Vegetarian Capsules

NON!


Un cadeau
empoisonné!
45.601830,...




Stationnement
des Érables
argentés

Les îles britanniques

JAPANESE KNOTWEED
IS THE BIGGEST PROBLEM
FACING THE CONSTRUCTION
INDUSTRY TODAY

Japanese knotweed invasion causes Hertfordshire home price drop

The price of a couple's Hertfordshire house has dropped by more than £250,000 because Japanese knotweed has invaded it, according to an independent surveyor.

With its value falling from an estimated £305,000 to £50,000, experts have told owners Matthew Jones and Sue Banks from Broxbourne that, unless action is taken, it will be impossible to sell.

They have been told 10ft (3m) of soil needs to be removed from beneath the foundations to

Japanese knotweed forced its way into the couple's Broxbourne home

BBC News, 27 octobre 2011

Réchauffement climatique :

dissémination des espèces envahissantes vers le nord

KUDZU (*Pueraria montana*)

HYDRILLE (*Hydrilla verticillata*)


Renouée japonaise :
floraison tardive
(septembre, octobre)

Renouée japonaise :

aucune reproduction sexuée au Québec ?

The Biology of Invasive Alien Plants in Canada.
5. *Polygonum cuspidatum* Sieb. & Zucc.
[= *Fallopia japonica* (Houtt.) Ronse Decr.]

Jacob N. Barney[1], Nishanth Tharayil[2], Antonio DiTommaso[3], and Prasanta C. Bhowmik[2]

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Received 9 September 2005, accepted 23 March 2006.

(b) *Seed Production and Dispersal* — Despite numerous published accounts related to the vegetative mode of reproduction of *P. cuspidatum* in its native and introduced range, seed production and recruitment may also play a role in the geographic expansion of this invader. However, the identity of the parental taxa involved in seed production is often unknown, especially in the United Kingdom where only female clones exist. There are no reports of agamospermically produced seeds in any populations throughout its range.

American Journal of Botany

American Journal of Botany 101(3): 459–466, 2014.

Sexual reproduction of Japanese knotweed (*Fallopia japonica* s.l.) at its northern distribution limit: New evidence of the effect of climate warming on an invasive species[1]

Elisabeth Groeneveld[2], François Belzile[3], and Claude Lavoie[2,4]

[2]École supérieure d'aménagement du territoire et de développement régional; and [3]Département de phytologie, Université Laval Québec City, Québec G1A 0V6 Canada

- *Premise of the study:* In response to climate warming, plant species may shift their distribution northward, but such a process is slow and hard to detect. Alternatively, phenological changes (earlier flowering) are expected as first adaptations for populations located near their distribution limit. That could be the case for the invasive Japanese knotweed (*Fallopia japonica* s.l., including the hybrid Bohemian knotweed *F.* ×*bohemica*). We hypothesized that climate warming now allows the species to produce viable seeds in the northernmost populations.
- *Methods:* Seeds were collected along a 550 km long transect in Québec, Canada, and tested for germination. The genetic diversity of a population was determined using polymorphic microsatellite markers to verify whether the species is actually producing new individuals through sexual reproduction.
- *Key results:* Japanese knotweed produces, in Québec, a large number of seeds with a high germination rate (up to 93%). The geographical limit for viable seed production in North America has been extended to Québec City, about 500 km north of the formerly reported limit. Bohemian knotweeds are genetically diverse, while true Japanese knotweeds all share a common multilocus genotype. This suggests that Bohemian knotweed stands mostly arose from seed, while true Japanese knotweeds result only from the propagation of rhizome or stem fragments.
- *Conclusions:* The effect of climate change is already palpable on the phenology of invasive plant species at their northern distribution limit. Bohemian knotweed, which until recently was rare in Québec, could rapidly spread in the near future with the help of an additional diaspore type (seeds).

Key words: Bohemian knotweed; *Fallopia* ×*bohemica*; *Fallopia japonica*; genetic diversity; invasive plant; Japanese knotweed; seed viability; urban heat island.

In response to climate warming, several animal species in the Northern Hemisphere are currently displacing their distribution toward more northern latitudes to maintain climatic conditions suitable for the completion of their life cycle (Parmesan, 1996; Parmesan and Yohe, 2003; Chen et al., 2011). Plants will also likely shift their distribution (Bergamini et al., 2009), but only through the dispersal of spores, seeds, and plant fragments. Such a process is usually slow, and a large number of vascular plant populations will eventually face new conditions for which they are not well adapted. These populations are at risk, and range contractions will likely result from local extinctions, especially at southern latitudes (Iverson et al., 1999; Gómez-Mendoza and Arriaga, 2007; Loarie et al., 2008; Svenning and Sandel, 2013). On the other hand, near the northern distribution limit, warmer conditions will probably benefit several species. In the short term, phenological changes such as earlier flowering or fruiting are expected as first adaptations (Primack et al., 2004; Lavoie and Lachance, 2006; Diskin et al., 2012; Panchen et al., 2012; Colautti and Barrett, 2013). Some species will also probably produce a higher number of viable seeds with the extension of the growing season (Lovat, 2013), which could favor their spread northwards.

Japanese knotweed (*Fallopia japonica* (Houttuyn) Ronse-Decraene; Polygonaceae) is one of the species likely to benefit from warmer conditions. This Asian species was introduced as an ornamental plant in New York around 1873, and has since spread throughout North America, especially in the northeastern, southwestern, and midwestern parts of the continent and along the Pacific coast. In eastern Canada, many populations are well established, and the species reaches its northern distribution limit in the province of Québec (Barney et al., 2006). This highly productive species chokes other plants by competition (Bímová et al., 2004; Maerz et al., 2005; Dassonville et al., 2007; Gerber et al., 2008; Aguilera et al., 2010; Maurel et al., 2010). Infested sites have a concentration of copper, manganese, phosphorus, potassium, and zinc up to 35–60% higher than noninvaded sites, probably because the deep roots and the extensive rhizome system of the plant extract from the soil minerals that are usually not accessible to other vascular plants (Dassonville et al., 2007). Japanese knotweed also produces allelopathic compounds that affect the growth of other forbs (Murrell et al., 2011). In its introduced range, Japanese knotweed

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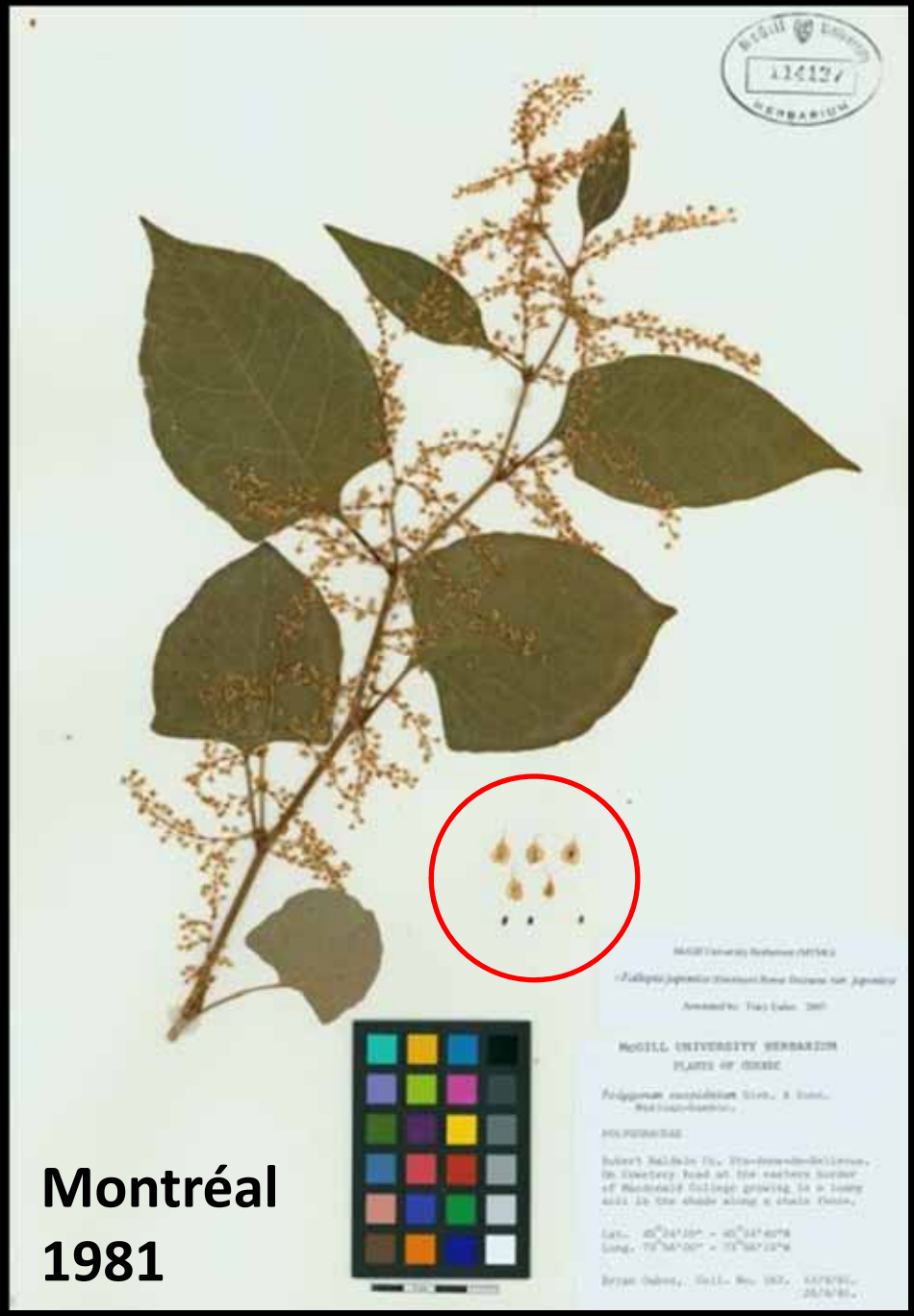
Renouée japonaise :
aucune reproduction sexuée au Québec ?



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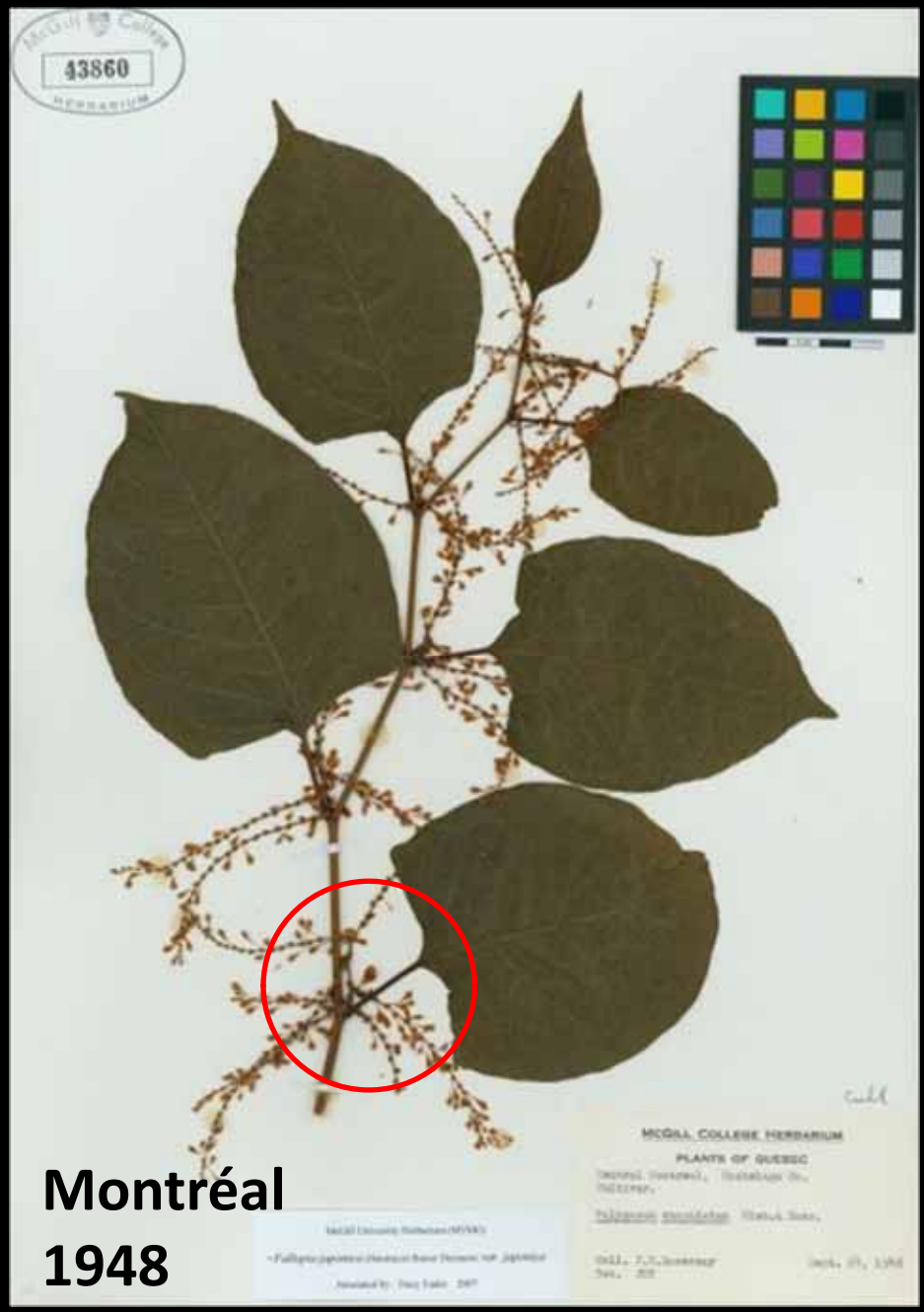
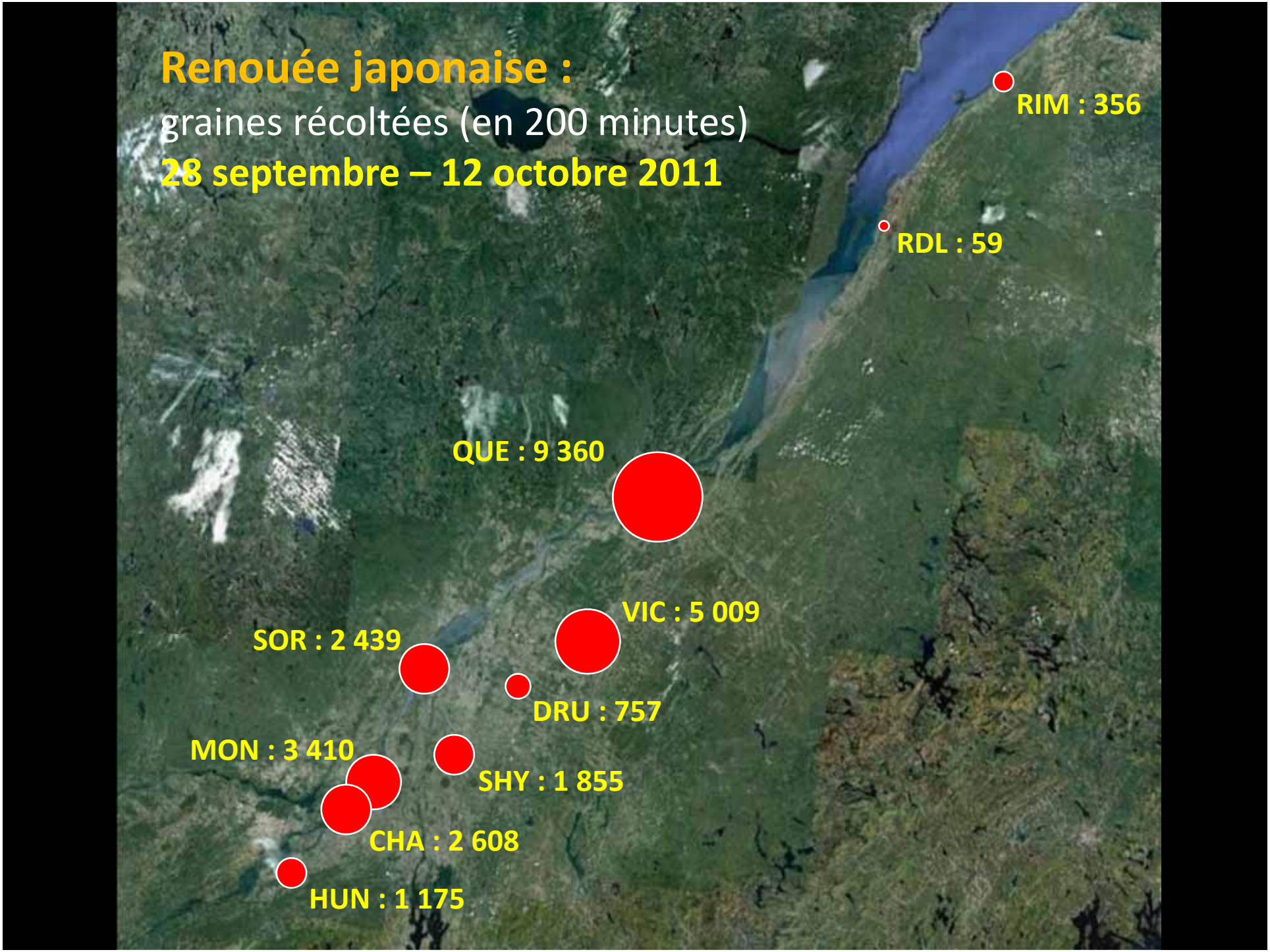
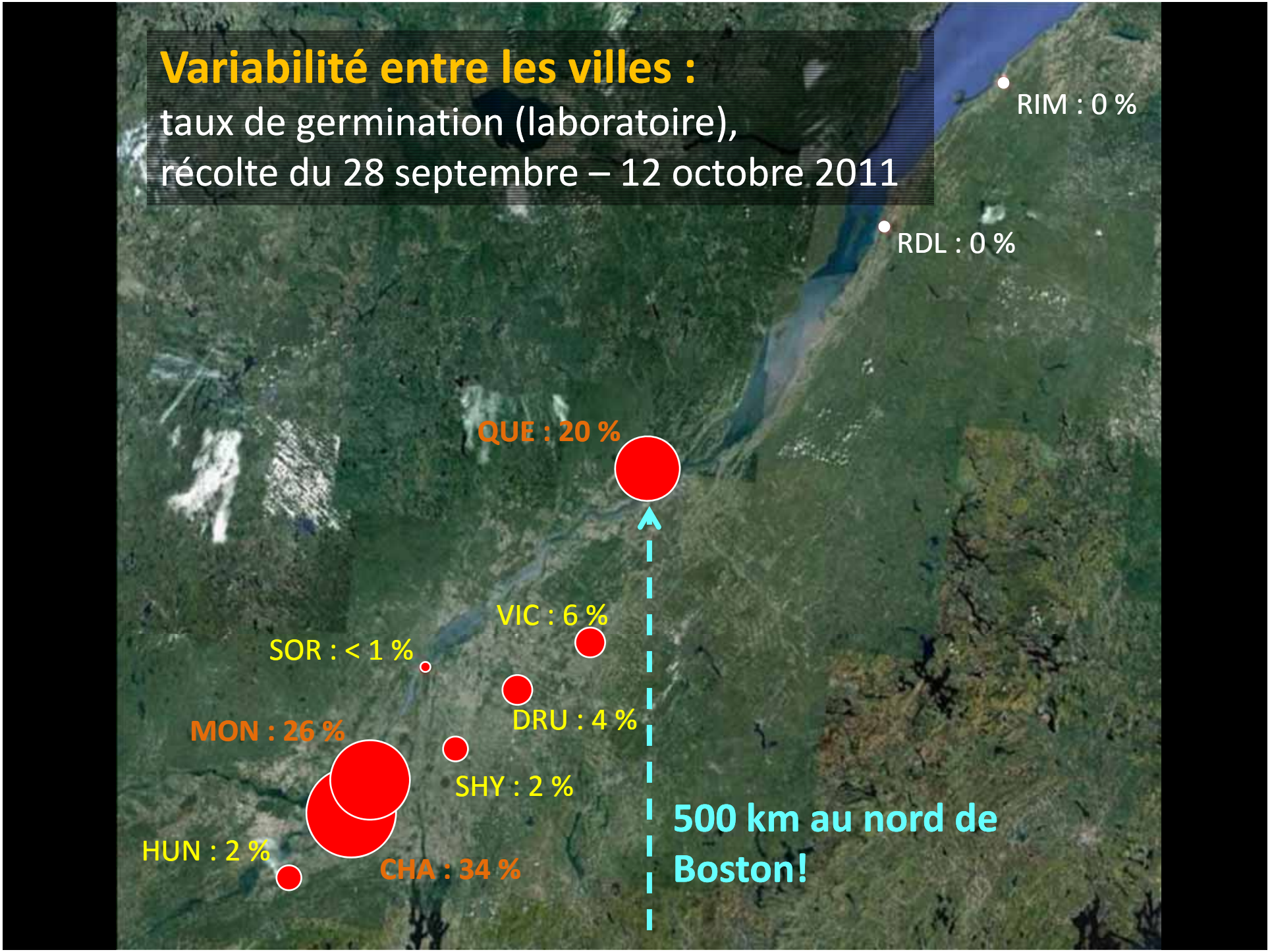


Montréal
1948


Huntingdon
Châteauguay
Montréal
Saint-Hyacinthe
Sorel
Victoriaville
Québec
Rivière-du-Loup
Rimouski


Renouée japonaise :
graines récoltées (en 200 minutes)
28 septembre – 12 octobre 2011
RIM : 356
RDL : 59
QUE : 9 360
VIC : 5 009
SOR : 2 439
DRU : 757
MON : 3 410
SHY : 1 855
CHA : 2 608
HUN : 1 175


Variabilité entre les villes :
taux de germination (laboratoire),
récolte du 28 septembre – 12 octobre 2011
RIM : 0 %
RDL : 0 %
QUE : 20 %
VIC : 6 %
SOR : < 1 %
DRU : 4 %
MON : 26 %
SHY : 2 %
HUN : 2 %
CHA : 34 %
500 km au nord de Boston!

Variabilité à l'intérieur d'une ville (Québec) :

taux de germination (laboratoire), récolte du 3 octobre 2011

Variabilité selon la date de récolte :

taux de germination (laboratoire)

3 octobre 2011 : **41 %**

28 novembre 2011 : **87 %**

26 janvier 2012: **79%**

17 février 2012 : **80 %**

5 mars 2012 : **73 %**

Québec, graines matures: 58%

Boston (1999) : 63 %

Le boulevard Champlain: échantillonnage novembre 2012

Fallopia japonica var. japonica + *F. sachalinensis* = *F. x bohemica*

Evolutionary Applications

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ORIGINAL ARTICLE

Hybridization increases invasive knotweed success

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3 CABI Europe Switzerland, Delémont, Switzerland

Keywords
allelopathy, biological invasions, competitive ability, Fallopia, hybridization, invasiveness

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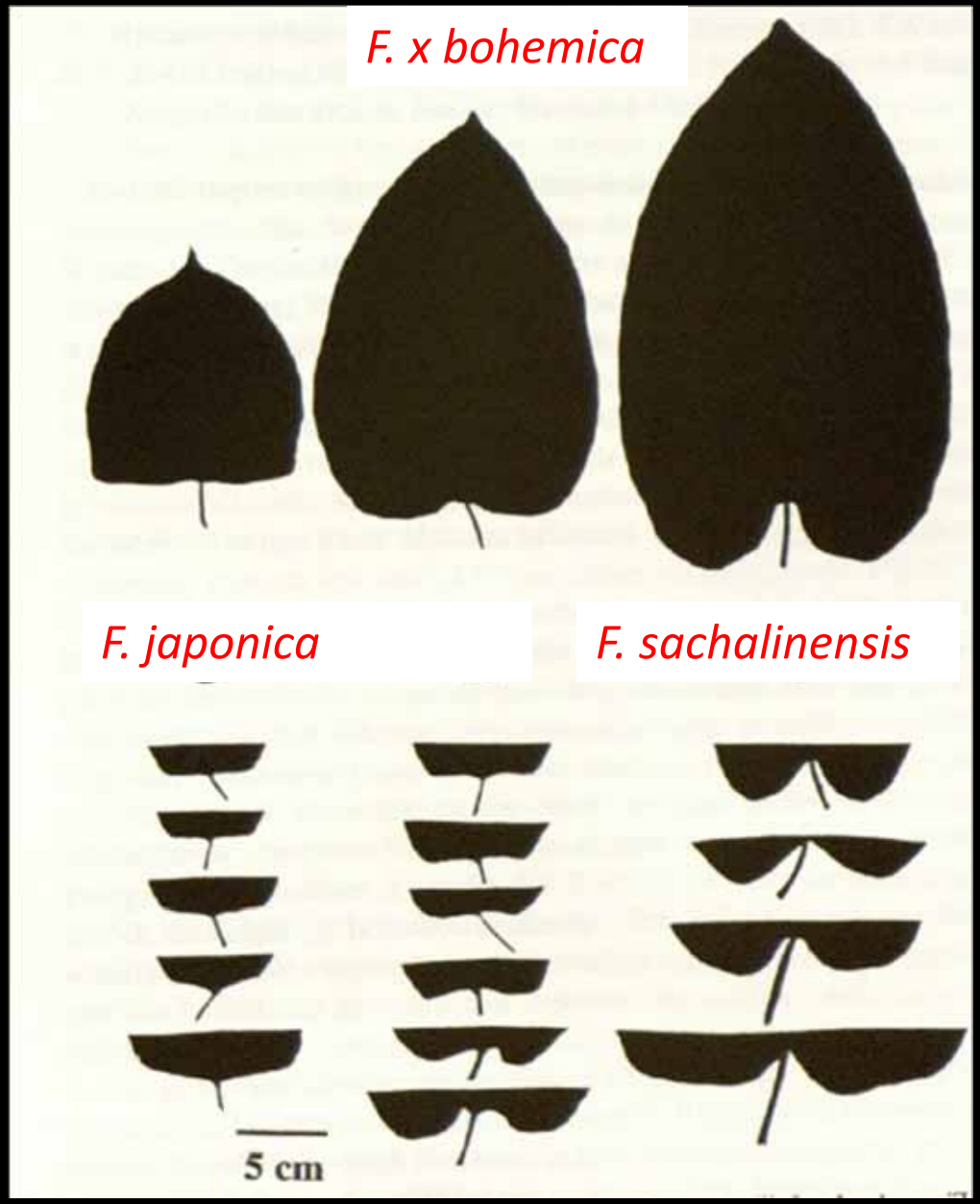
Abstract

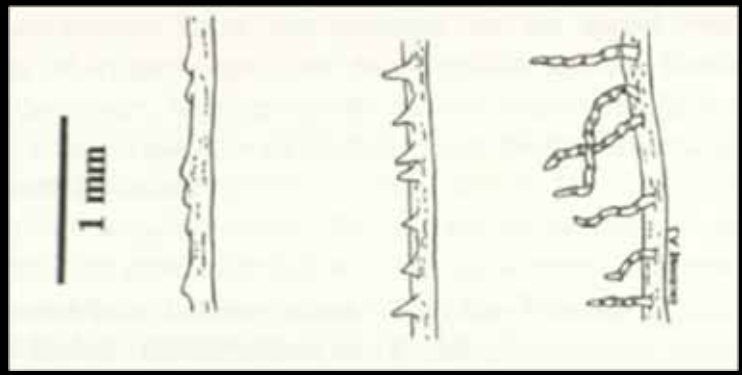
Hybridization is one of the fundamental mechanisms by which rapid evolution can occur in exotic species. If hybrids show increased vigour, this could significantly contribute to invasion success. Here, we compared the success of the two invasive knotweeds, *Fallopia japonica* and *F. sachalinensis*, and their hybrid, *F.* × *bohemica*, in competing against experimental communities of native plants. Using plant material from multiple clones of each taxon collected across a latitudinal gradient in Central Europe, we found that knotweed hybrids performed significantly better in competition with a native community and that they more strongly reduced the growth of the native plants. One of the parental species, *F. sachalinensis*, regenerated significantly less well from rhizomes, and this difference disappeared if activated carbon was added to the substrate, which suggests allelopathic inhibition of *F. sachalinensis* regeneration by native plants. We found substantial within-taxon variation in competitive success in all knotweed taxa, but variation was generally greatest in the hybrid. Interestingly, there was also significant variation within the genetically uniform *F. japonica*, possibly reflecting epigenetic differences. Our study shows that invasive knotweed hybrids are indeed more competitive than their parents and that hybridization increased the invasiveness of the exotic knotweed complex.

Introduction

Hybridization is an important and common evolutionary process in plants and animals (Arnold 2004). Despite the potential complications that hybridization can cause for the survival and in particular reproduction of hybrids (Husband 2000; Ramsey and Schemske 2002), their frequency is particularly high in rapidly radiating groups (Abbott et al. 2000; Seehausen 2004; Grant et al. 2005; Mallet 2007), which indicates that hybridization also offers advantages. For instance, novel genetic combinations may enable these taxons to outcompete and eventually displace their parents (Buerkle et al. 2000) or they may provide evolutionary innovations that allow them to cross valleys in the adaptive landscape that limit the adaptation of the parents (Barton 2001; Rieseberg et al. 2003).

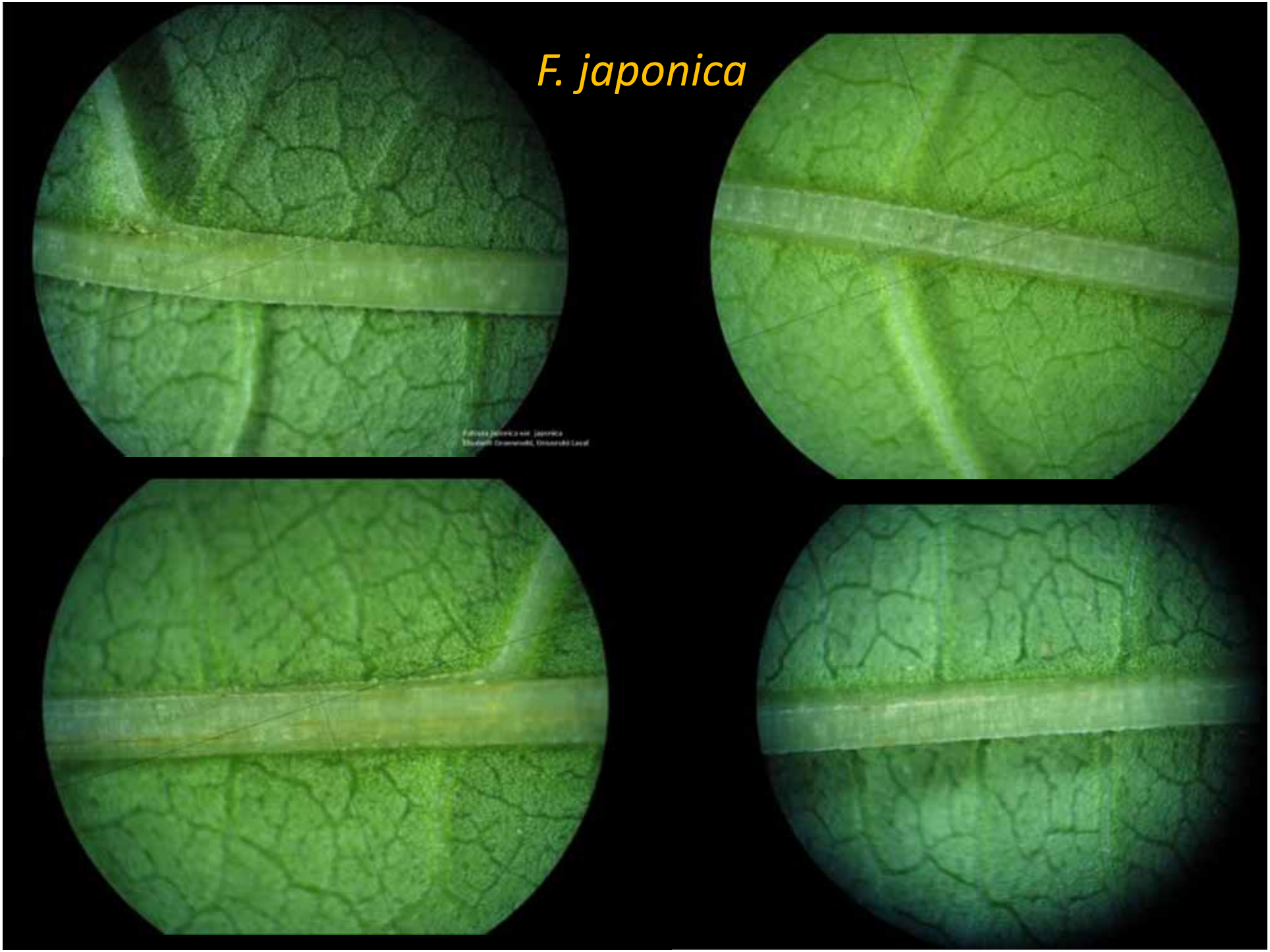
Invasive exotic species are particularly interesting in this context, because they offer many well-documented examples of rapid evolution in which hybridization appears to play an important role (Abbott 1992; Ellstrand and Schierenbeck 2000; Zalapa et al. 2010; Blair et al. 2012). Oftentimes, the rapid spread and resulting ecological and economic problems of invasive species only begin after a lag phase (Ewel et al. 1999; Crooks 2005), possibly because these species first undergo evolutionary changes (Sakai et al. 2001; Lee 2002; Bossdorf et al. 2005; Suarez and Tsutsui 2008). For some of these species, these may be inter- or intraspecific hybridization events. There are many cases where hybridization of invasive species has been documented with molecular methods (e.g. Milne and Abbott 2000; Gaskin and Schaal 2003; Gallagher et al. 2011). Previous studies that compared the invasiveness of hybrids to that of their parents found that hybrids can be more plastic and more tolerant to environmental conditions (Weber and D'Antonio 1999), better competitors against native plants (Daehler and Strong 1997) or spreading faster than parents (Vila and D'Antonio 1998; Hovick et al. 2012). However, such direct comparisons of invasive hybrids and their parents remain scarce.



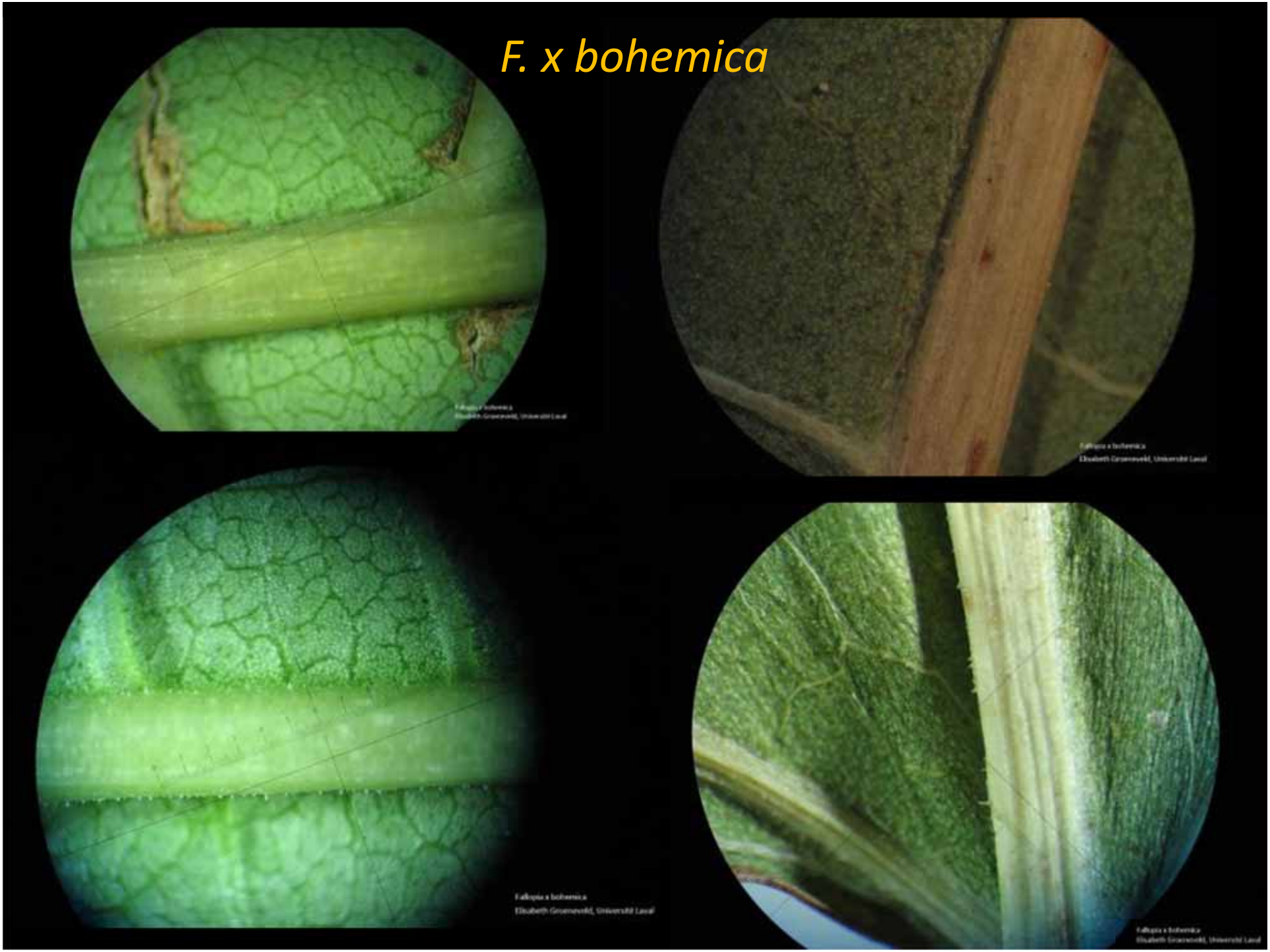


Zika & Jacobson. 1993. Rhodora 105:143-152

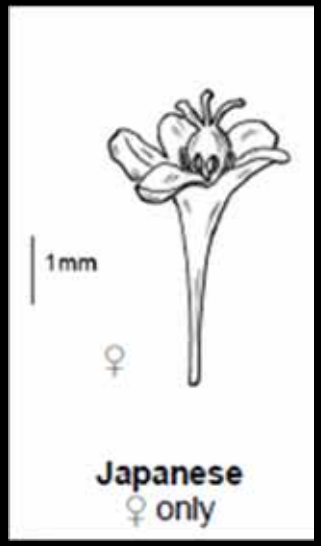
F. japonica



F. x bohemica



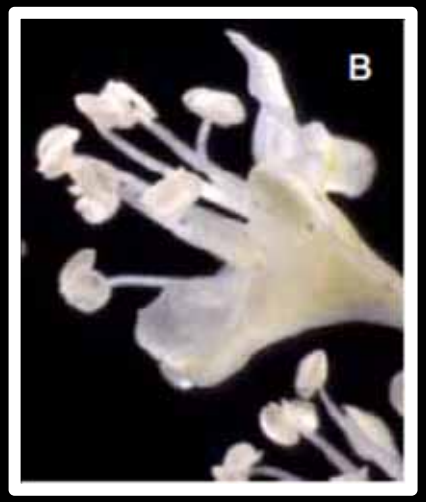
Fallopia japonica



Prather, Miller & Robins. 2009. Knotweed shrubs: identification, biology, and management. A Pacific Northwest Extension Publication. PNW 610.

Wilson. 2007. Key to identification of invasive knotweeds in British Columbia. BC Ministry of Forests and Range, Forest Practice Branch, Kamloops, B.C.

Fallopia x bohemica



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Wilson. 2007. Key to identification of invasive knotweeds in British Columbia. BC Ministry of Forests and Range, Forest Practice Branch, Kamloops, B.C.

Comment s’en débarrasser?

Fauchage / Coupe répétée

La coupe répétée…


Fleuve Saint-Laurent
Chemin Vinet

Excavation

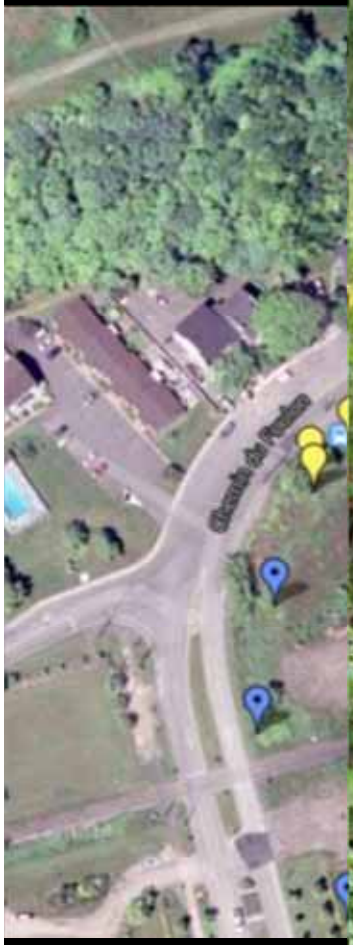
Avantages

- Très rapide
- Efficace

Désavantages

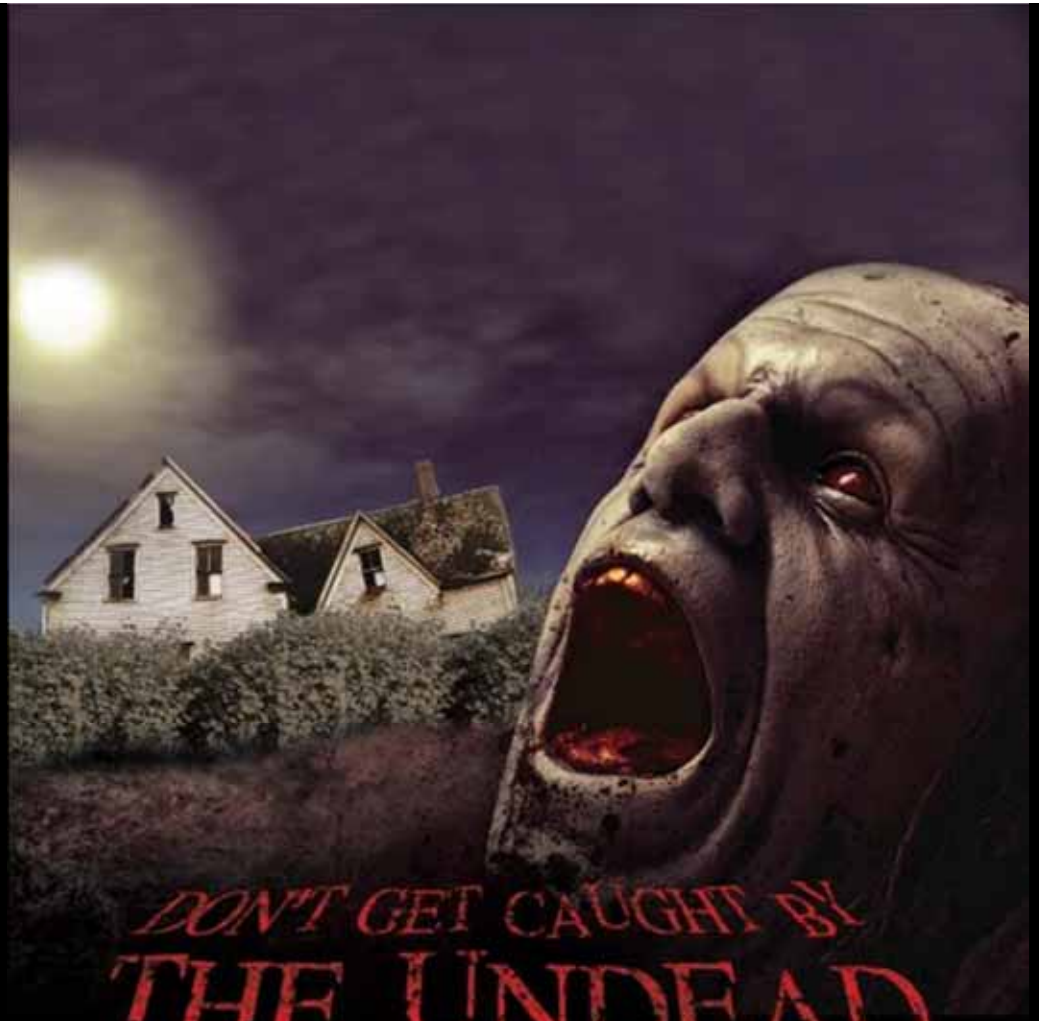
- Coûteux
- Risque de contamination

Excavation – Attention!



Herbicides

Grenz, J. 2011. Knotweed and hogweed, oh my! Lessons learned from the 2011 field season. Presentation given at the IPCMV's fall forum.



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Chemin du Lac Saint Louis
Chemin du Lac Saint Louis


2009
2012 : Coupe + herbicide
2013 : 5 coupes + 3x herbicides


2013

En résumé :

- Une plante nuisible et envahissante au Québec.
- Présence de l'hybride.
- Elle produit des graines viables.
- La reproduction sexuée risque de devenir plus importante avec le réchauffement du climat.
- Éradication très difficile.