

# Bram D'hondt

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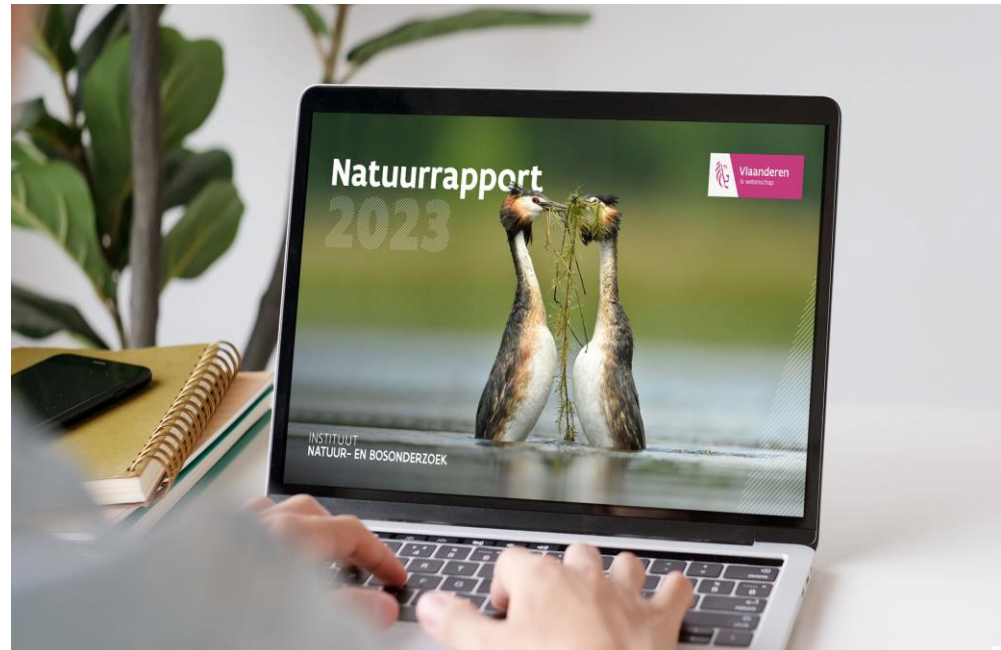
Interreg



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MigFoRest



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# Assessing Invasiveness Risk in Assisted Migration Strategies

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# “Invasive” ?



***Rhododendron ponticum***  
hindering tree regeneration  
(closed environment)



***Prunus serotina***  
overgrowing heathland  
(open environment)

# To be clear

- Two definitions of “invasive”
    - = spreading easily
    - = **spreading easily + negative impact**
  
  - Generic label vs. **specific conditions**
    - No species is ‘invasive’ always everywhere
    - E.g. previous slide
  
  - One man’s loss is another man’s gain
    - A representation of **values** and **interests**
-

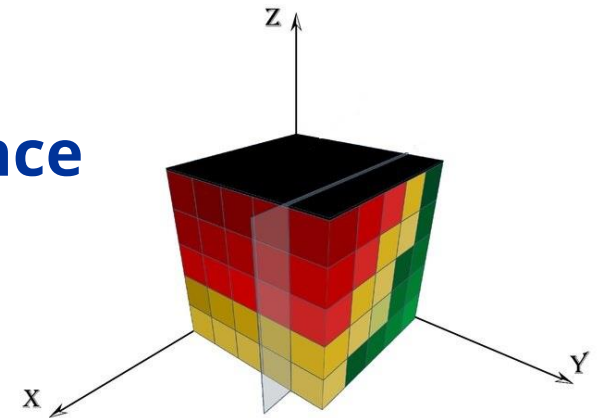
# Concept

**Introduction** (assisted migration) =  
**human action** with **risks** attached

- “risk assessment”
- common (research) field
  - finance, industry, ...
  - environmental sciences
- **exposure x likelihood x consequence**
- e.g. “pest risk analysis” (PRA)
- **high-risk  $\approx$  invasive**



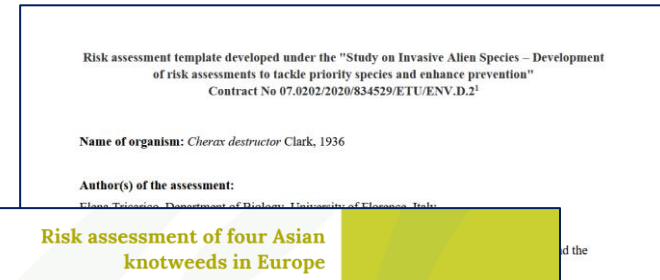
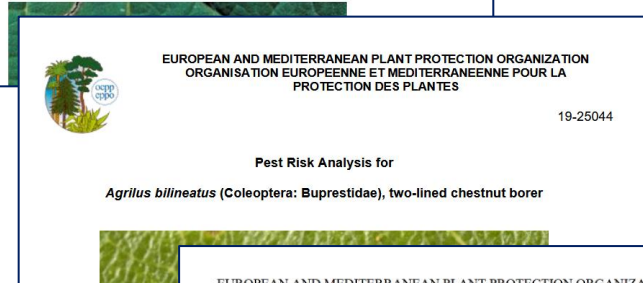
<https://www.iso.org/>



# Examples (PRA's)

**Plant health** (e.g. EU Directive 2000/29)  
Long tradition  
a.o. European Plant Protection Organization (EPPO)

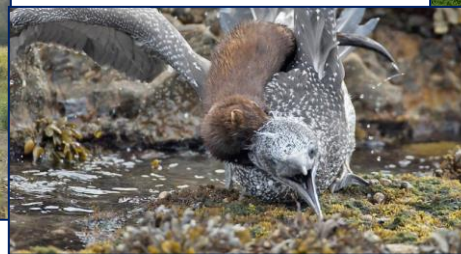
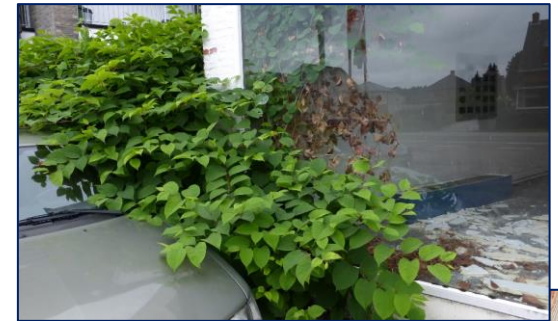
**Nature conservation** (e.g. EU Regulation 2014/1143)  
More recent  
a.o. European Commission



# Types of impact



Photo 2. The right hand 48 h after exposure to giant hogweed



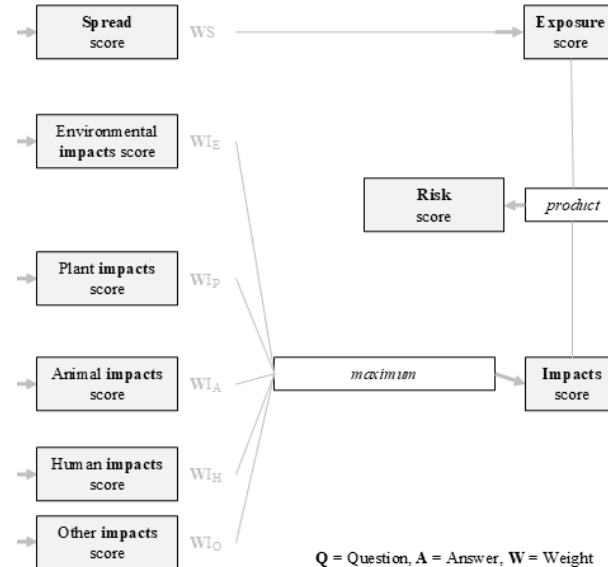
# Screening

- *Harmonia*<sup>+</sup> protocol
  - questions
  - verbatim + numeric
  - [ias.biodiversity.be/](http://ias.biodiversity.be/)



Species	NWE terr	RA
<i>Quercus robur</i>	100%	none
<i>Quercus petraea</i>	97%	none
<i>Sorbus aria</i>	96%	none
<i>Fagus sylvatica</i>	94%	none
<i>Acer campestre</i>	92%	none
<i>Tilia platyphyllos</i>	83%	none
<i>Tilia cordata</i>	80%	none
<i>Acer platanooides</i>	63%	full
<i>Sorbus torminalis</i>	62%	full
<i>Quercus pubescens</i>	38%	full
<i>Sorbus domestica</i>	29%	full
<i>Abies alba</i>	15%	full
<i>Quercus pyrenaica</i>	5%	full
<i>Acer monspessulanum</i>	3%	full
<i>Quercus ilex</i>	1%	full
<i>Abies cephalonica</i>	0%	full
<i>Abies pinsapo</i>	0%	full
<i>Alnus cordata</i>	0%	full
<i>Fagus orientalis</i>	0%	full
<i>Pinus pinaster</i>	0%	full
<i>Quercus canariensis</i>	0%	full
<i>Quercus faginea</i>	0%	full
<i>Quercus frainetto</i>	0%	full
<i>Tilia tomentosa</i>	0%	full

Module	Spread
Q06	The species' capacity to disperse outside target areas by natural means is ...
Q07	The species' frequency of dispersal outside target areas by human actions is ...
Module	Impacts: environmental targets (wild animals, plants, habitats, ecosystems)
Q08	The species may have a ... effect on native species, through predation, parasitism or herbivory.
Q09	The species may have a ... effect on native species, through competition.
Q10	The species may have a ... effect on native species, through interbreeding.
Q11	The species may have a ... effect on native species, by hosting pathogens or parasites that are harmful to them.
Q12	The species may have a ... effect on ecosystem integrity, by affecting its abiotic properties.
Q13	The species may have a ... effect on ecosystem integrity, by affecting its biotic properties.
Module	Impacts: plant targets (cultivated plants)
Q14	The species may have a ... effect on plant targets, through herbivory or parasitism.
Q15	The species may have a ... effect on plant targets, through competition.
Q16	The species may have a ... effect on plant targets, by interbreeding with related organisms or with the target itself.
Q17	The species may have a ... effect on plant targets, by affecting the cultivation system's integrity.
Q18	The species may have a ... effect on plant targets, by hosting pathogens or parasites that are harmful to them.
Module	Impacts: animal targets (domesticated animals)
Q19	The species may have a ... effect on individual animal health or animal production, through predation or parasitism.
Q20	The species may have a ... effect on individual animal health or animal production, by having properties that are hazardous upon contact.
Q21	The species may have a ... effect on individual animal health or animal production, by hosting pathogens or parasites that are harmful to them.
Module	Impacts: human targets
Q22	The species may have a ... effect on human health, through parasitism.
Q23	The species may have a ... effect on human health, by having properties that are hazardous upon contact.
Q24	The species may have a ... effect on the health of human targets, by hosting pathogens or parasites that are harmful to them.
Module	Impacts: other targets
Q25	The species may have a ... effect on causing damage to infrastructure.



# Selected processes

## Module Spread

Q06 The species' capacity to disperse outside target areas by natural means is ...

Q07 The species' frequency of dispersal outside target areas by human actions is ...

## Module Impacts: environmental targets (wild animals, plants, habitats, ecosystems)

Q08 The species may have a ... effect on native species, through predation, parasitism or

Q09 The species may have a ... effect on native species, through competition.

Q10 The species may have a ... effect on native species, through interference.

Q11 The species may have a ... effect on native species, by hosting pathogens or parasites that are harmful to them.

Q12 The species may have a ... effect on ecosystem integrity, by affecting its abiotic properties.

Q13 The species may have a ... effect on ecosystem integrity, by affecting its biotic properties.

## Module Impacts: plant targets (cultivated plants)

Q15 The species may have a ... effect on plant targets, through competition.

Q16 The species may have a ... effect on plant targets, through interference, with or without the target itself.

Q17 The species may have a ... effect on plant targets, by affecting the cultivation system's integrity.

Q18 The species may have a ... effect on plant targets, by hosting pathogens or parasites that are harmful to them.

## Module Impacts: animal targets (domesticated animals)

Q19 The species may have a ... effect on individual animal health or animal production, through predation or parasitism.

Q20 The species may have a ... effect on individual animal health or animal production, by having properties that are hazardous upon contact.

Q21 The species may have a ... effect on individual animal health or animal production, by hosting pathogens or parasites that are harmful to them.

## Module Impacts: human targets

Q22 The species may have a ... effect on human health, through parasitism.

Q23 The species may have a ... effect on human health, by having properties that are hazardous upon contact.

Q24 The species may have a ... effect on the health of human targets, by hosting pathogens or parasites that are harmful to them.

## Module Impacts: other targets

Q25 The species may have a ... effect on causing damage to infrastructure.

- **Competition**
- generally (very) **low** (- medium)
- *non-forest habitats*
  - ≈ late-successional species
  - ≈ no vigorous clonal growth
  - vs. many true invaders !
  - ± *Quercus, Pinus*
- *forest habitats*
  - ≈ shading !
  - ± *Fagus, Abies*

# Selected processes

- Pathogens, parasites, pests
- generally low to medium
- assisted co-migration of pests
  - infected nursery stock
  - stepping stone populations
- all are host, some major host
- phytosanitary measures

## Module Spread

Q06 The species' capacity to disperse outside target areas by natural means is ...

Q07 The species' frequency of dispersal outside target areas by human actions is ...

## Module Impacts: environmental targets (wild animals, plants, habitats, ecosystems)

Q08 The species may have a ... effect on native species, through predation, parasitism or herbivory.

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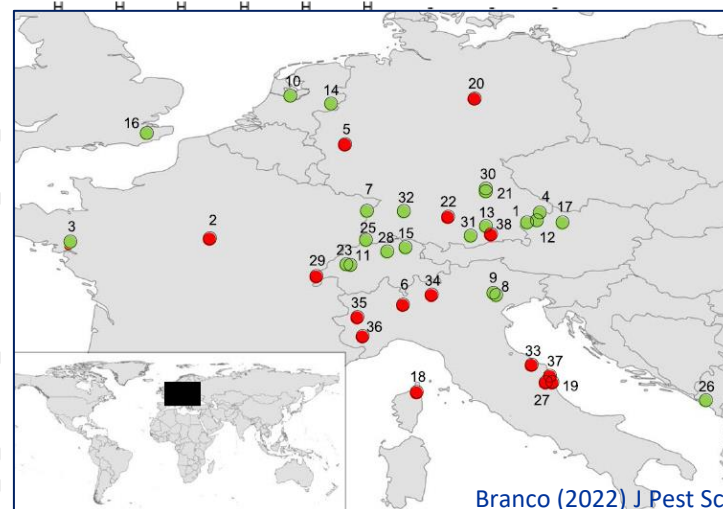
Q24 The species may have a ... effect on the health of human targets, by hosting pathogens or parasites that are harmful to them.

## Module Impacts: other targets

Q25 The species may have a ... effect on causing damage to infrastructure.

Table 7: Pest species from the EPPO A2 list for which the 17 species under assessment are reported as host (H) **abal** *Abies alba*, **abce** *Abies cephalonica*, **abpi** *Abies pinsapo*, **acmo**: *Acer monspessulanum*, **acpl** *Acer platanoides*, **quca** *Quercus canariensis*, **qufa** *Quercus faginea*, **qufr** *Quercus frainetto*, **quil** *Quercus ilex*, **qupy** *Quercus pyrenaica*, **sor** *Sorbus torminalis*, **tito** *Tilia tomentosa*.

group	species	abal	abce	abpi	acmo	acpl	alco	faor	pipi	
Bacteria	<i>Erwinia amylovora</i>	-	-	-	-	-	-	-	-	
	<i>Xylella fastidiosa</i>	-	-	-	-	H	-	-	-	
Chromista	<i>Phytophthora kernoviae</i>	-	-	-	-	-	-	-	-	
	<i>Phytophthora ramorum</i>	H	-	-	-	-	H	-	-	
Fungi	<i>Cronartium kamschaticum</i>	-	-	-	-	-	-	-	H	
	<i>Cryphonectria parasitica</i>	-	-	-	H	H	-	-	-	
	<i>Fusarium circinatum</i>	-	-	-	-	-	-	-	H	
	<i>Fusarium euwallaceae</i>	-	-	-	-	-	-	-	-	
	<i>Heterobasidion irregulare</i>	H	H	H	-	-	-	-	MH	
	<i>Lecanosticta acicola</i>	-	-	-	-	-	-	-	H	
Insecta	<i>Agrilus bilineatus</i>	-	-	-	-	-	-	-	-	
	<i>Anoplophora chinensis</i>	-	-	-	MH	H	MH	-	H	
	<i>Anoplophora glabripennis</i>	-	-	-	H	MH	H	-	H	
	<i>Comstockaspis perniciosus</i>	-	-	-	-	-	-	-	-	
	<i>Crisicoccus pini</i>	H	H	H	-	-	-	-	H	
	<i>Euwallacea fornicatus sensu lato</i>	-	-	-	-	H	-	-	-	
	<i>Ips hauseri</i>	-	-	-	-	-	-	-	H	
	<i>Ips subelongatus</i>	H	H	H	-	-	-	-	-	
	<i>Lepidosaphes ussuriensis</i>	-	-	-	-	-	H	-	-	
	<i>Lopholeucaspis japonica</i>	-	-	-	-	-	-	-	-	
	<i>Malacosoma parallela</i>	-	-	-	-	-	-	-	-	
	<i>Megaplatypus mutatus</i>	-	-	-	-	-	-	-	H	
	Insecta	<i>Popillia japonica</i>	-	-	-	-	H	-	-	-
		<i>Scirtothrips citri</i>	-	-	-	-	-	-	-	-
<i>Tetropium gracilicorne</i>		H	H	H	-	-	-	-	H	
<i>Toumeyella parvicornis</i>		-	-	-	-	-	-	-	H	





# Selected processes

- Human (animal) health
- generally none - very low
- ≈ non-toxic, non-spiny
- ≈ *A. cordata* : hay-fever

## Module Spread

- Q06 The species' capacity to disperse outside target areas by natural means is ...
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## Module Impacts: environmental targets (wild animals, plants, habitats, ecosystems)

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## Module Impacts: animal targets (domesticated animals)

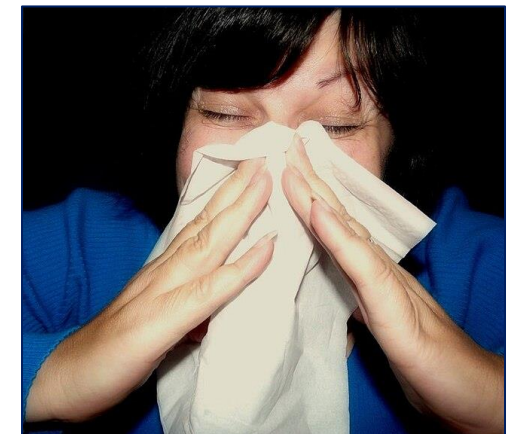
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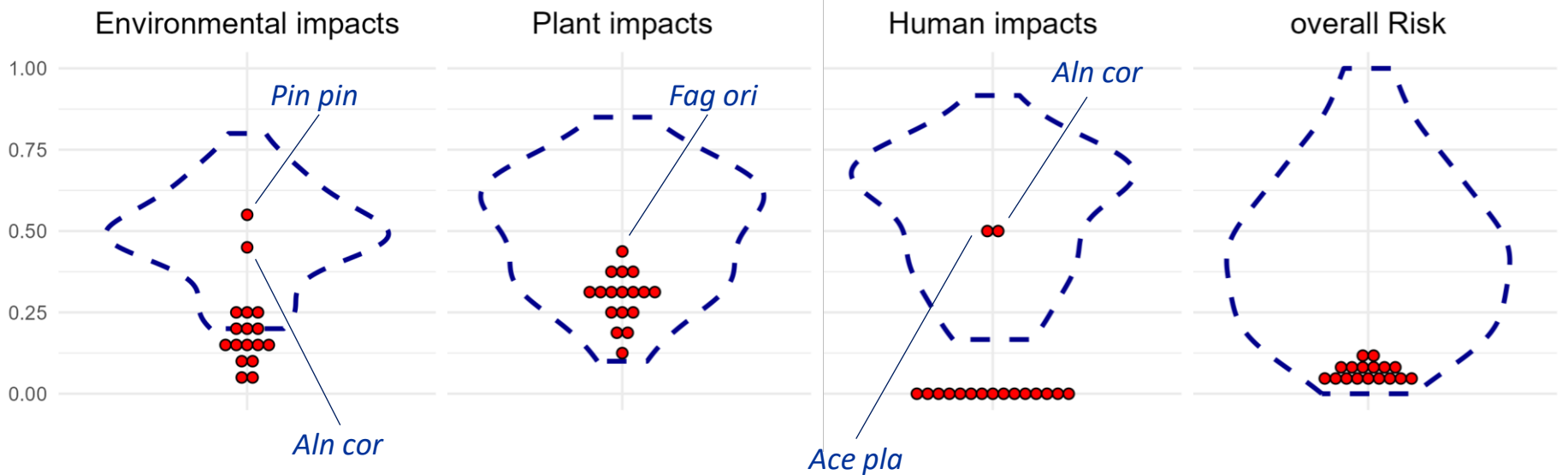
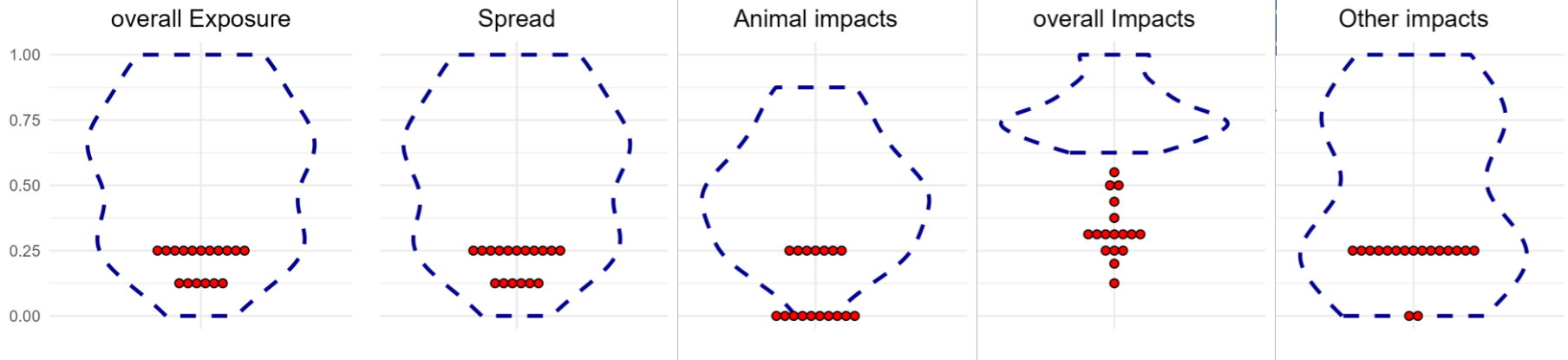
## Module Impacts: human targets

- Q22 The species may have a ... effect on human health, through parasitism.
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## Module Impacts: other targets

- Q25 The species may have a ... effect on causing damage to infrastructure.





● selected species

○ random assessments

# Summary

- for the selected species, **invasiveness** does not seem a strong argument against AM
  - **near-natives**
  - **related species**
  - **functional analogues**
  - **climax species**
- presumed safer choices than **alien** species
- the tricky thing with **genetics**
- caution even for **moderate** impacts
- **necessity** and **benefits should be scrutinized, too!**
  - extent of decline
  - compensatory measures
  - ...



**Interreg**



Co-funded by  
the European Union

**North-West Europe**



Hoogveld (municipality of Zedelgem)

**Thanks**

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- (Some species)



*Abies alba*  
Gewone  
zilverspar



*Abies cephalonica*  
Griekse  
zilverspar



*Abies pinsapo*  
Spaanse  
zilverspar



*Fagus orientalis*  
Kaukasische  
beuk



*Quercus canariensis*  
Algerijnse eik



*Quercus faginea*  
Portugese eik



*Quercus frainetto*  
Hongaarse eik



*Quercus pubescens*  
Donzige eik



*Quercus pyrenaica*  
Pyreneese eik



*Sorbus domestica*  
Tamme lijsterbes



*Sorbus torminalis*  
Elsbes



*Tilia tomentosa*  
Zilverlinde

# van Maaren (2024)

- *Liriodendron tulipifera*
- *Corylus colurna*
- *Quercus pubescens*
- *Torminalis glaberrima*
- *Alnus cordata*
- *Fagus orientalis*
- *Pinus pinaster*
- *Juglans nigra*



probos



## Risicobeoordeling uitheemse klimaatbestendige boomsoorten

Een beoordeling van de potentiële invasiviteit van acht boomsoorten middels het Harmonia+-protocol



Gino van Maaren, Inge Verbeek, Paul Copini, Joyce Penninkhof, Baudewijn Odé, Jesse Beyer, Johan van Valkenburg & Jenneke Leferink

Wageningen, december 2024

# van Maaren (2024)

Gemiddelde scores		
Ranking	Boomsoort	Risicoscore
1	Zwarte walnoot	0,087
2	Amerikaanse tulpenboom	0,143
3	Elsbes	0,149
4	Donzige eik	0,206
5	Oosterse beuk	0,316
6	Zeeden	0,340
7	Boomhazelaar	0,346
8	Hartbladige els	0,475

Re-evaluation

Taxon	Env.	Plant	Animal	Human	Other
<i>Juglans nigra</i>	LOW	LOW	LOW	LOW	LOW
<i>Liriodendron tulipifera</i>	LOW	LOW	LOW	LOW	LOW
<i>Torminalis glaberrima</i>	LOW	LOW	LOW	LOW	LOW
<i>Quercus pubescens</i>	LOW	LOW	LOW	LOW	LOW
<i>Fagus orientalis</i>	LOW	MEDIUM	LOW	LOW	LOW
<i>Pinus pinaster</i>	MEDIUM	LOW	LOW	LOW	LOW
<i>Corylus colurna</i>	LOW	LOW	LOW	MEDIUM	LOW
<i>Alnus cordata</i>	HIGH	LOW	LOW	MEDIUM	LOW



Figuur 6.1  
Elsbes (foto: Andrew Dunn, CC BY-SA 2.0).



Figuur 7.1  
Hartbladige els (foto: AnemoneProjectors, CC BY-SA 2.0).

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