



REGIONAL PERSPECTIVE OF INVASIVE PLANTS IN FORESTS



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Ingolf Kühn, Professor for Macroecology,
Helmholtz Centre for Environmental Research – UFZ &
Martin-Luther-University Halle-Wittenberg



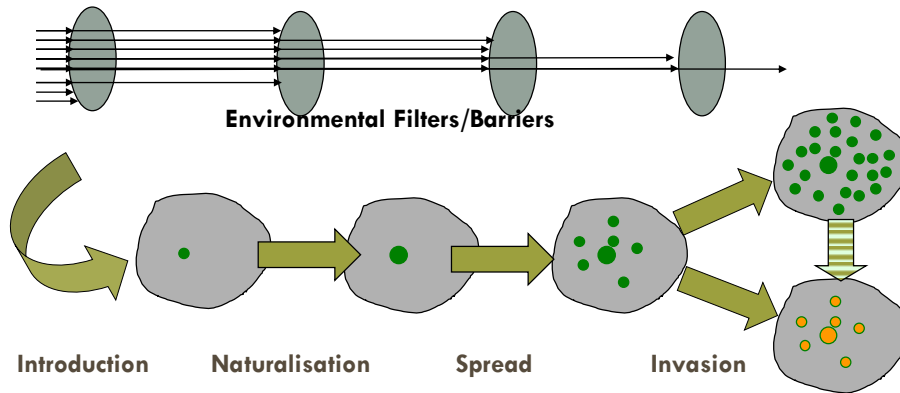
(REGIONAL) PERSPECTIVE OF INVASIVE PLANTS (IN FORESTS)



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Steps of the invasion process



See Richardson et al. 2000, Heger 2001, Rahel 2002, Colautti & MacIsaac 2004, Hulme 2004, Pyšek et al. 2004



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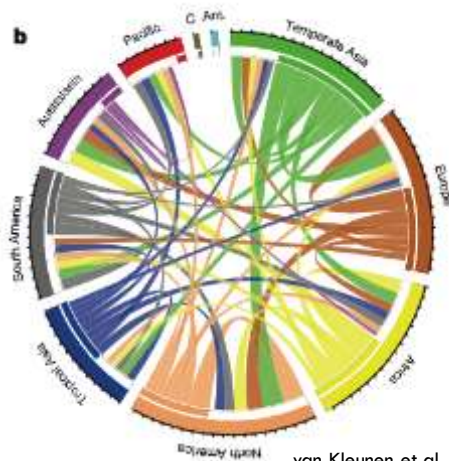
Where do they come from?



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Flow of naturalized alien plant species



van Kleunen et al. 2015, *Nature* 525: 100–103.



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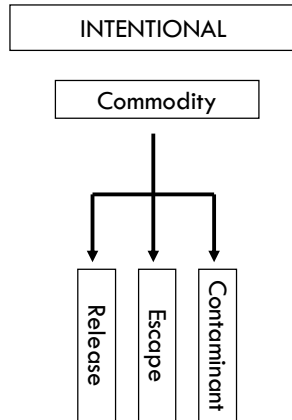
How do they come?



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Pathways of Biological Invasions

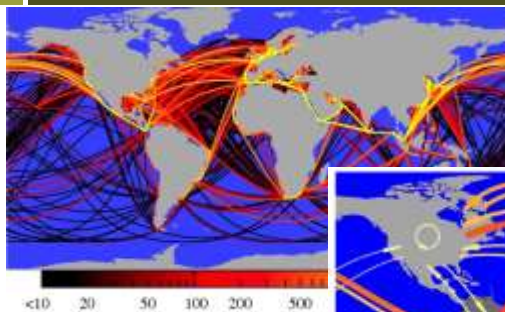


Hulme et al. 2008, *J. Appl. Ecol.* 45: 403–414



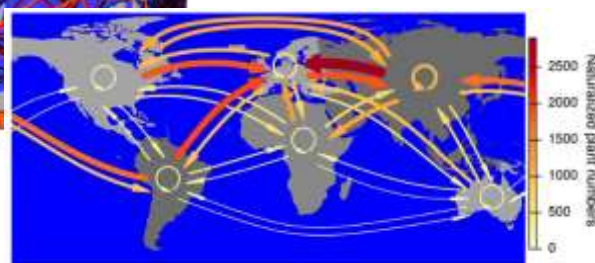
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Important Pathways of Biological Invasions: Commodities



Global Shipping Routes
Kaluza et al. *J. R. Soc. Interface*
doi:10.1098/rsif.2009.0495

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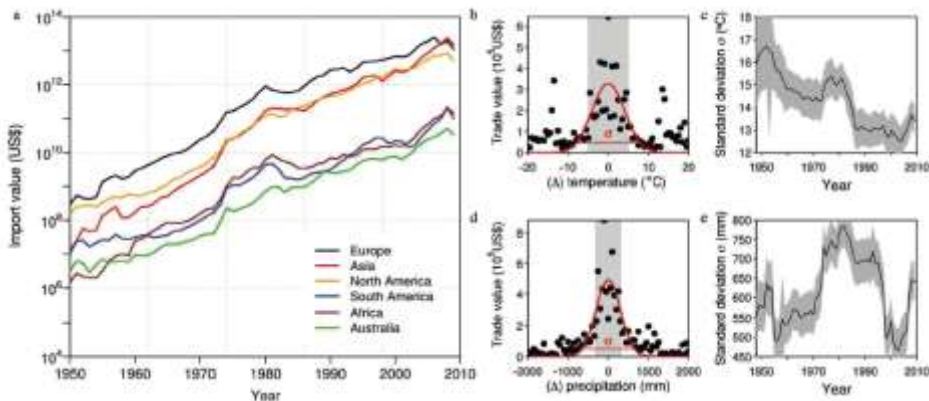


Network of Plant Invasions

Seebens et al. 2015, *Global Change Biology* 21: 4128–4140

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The role of bilateral trade in explaining biological invasions



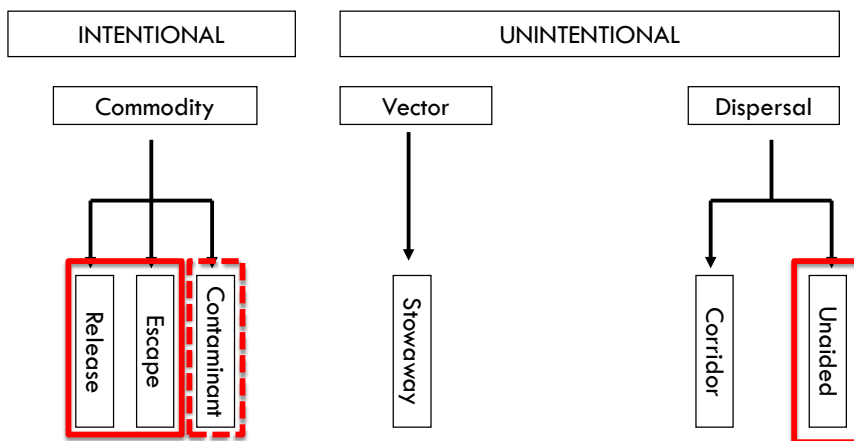
Essi et al., BioScience 65: 769-782



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Pathways of Biological Invasions



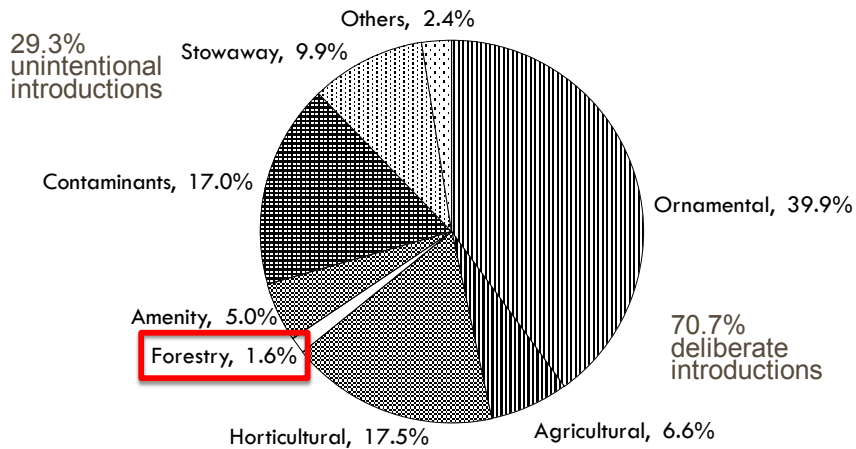
Hulme et al. 2008, J. Appl. Ecol. 45: 403-414



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Introduction pathways to Europe



after Pyšek et al. 2009, In DAISIE (eds.), 43-61. Springer, Dordrecht
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Where are they now?



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Distribution of naturalized species

- ❖ Naturalized vascular plant species covered by the GloNAF database.



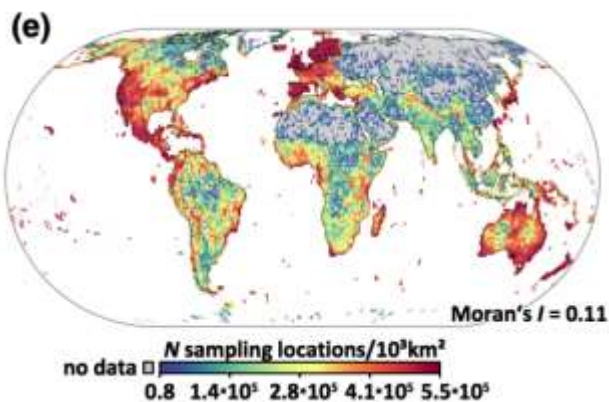
M van Kleunen *et al.* (2015) *Nature* **525**: 100–103



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Global Biodiversity Information Facility (GBIF) data coverage



Meyer *et al.* (2016) Multidimensional biases, gaps and uncertainties in global plant occurrence information. *Ecol Lett* 19: 992–1006.



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Alien plant species in Europe

Country/region	Total	Naturalized	Casual	Unspecified	Cryptogenic
Alien <i>in</i> Europe (total)	5789	3749	1507	504	29
European origin (total)	2671	1864	541	247	19
Alien <i>to</i> Europe (total)	2843	1780	872	183	8

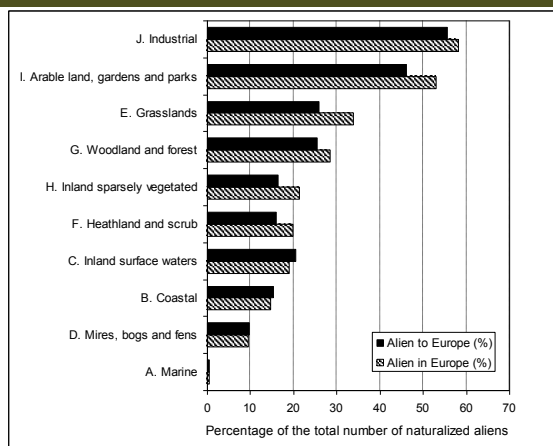
Lambdon et al. (2008) *Preslia* 80: 101-149



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Distribution of European naturalized aliens in EUNIS habitats



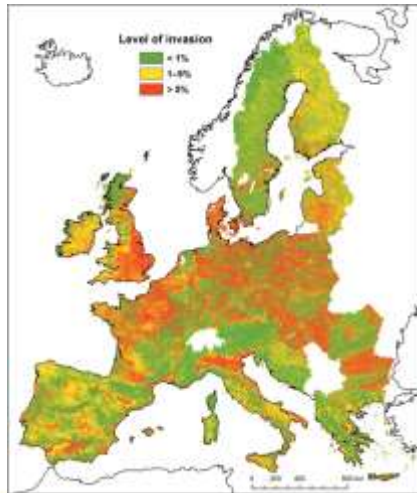
Lambdon et al. (2008) *Preslia* 80: 101-149



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Level of plant invasibility across Europe



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Map of plant invasions in Europe based on invasibility of EUNIS habitats (translated to CORINE land-cover) in three biogeographical regions.

Based on vegetation plot data from Chytrý et al. (2008) J. Appl. Ecol.

Chytrý et al. 2009, Diversity & Distributions 15: 98-107

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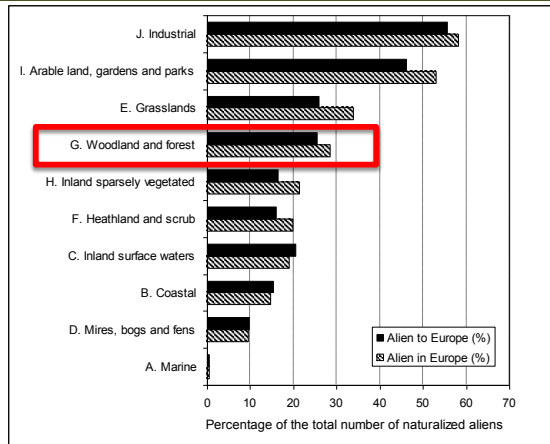
Alien Plants and Forests



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Distribution of European naturalized aliens in EUNIS habitats



Lambdon et al. (2008) *Preslia* 80: 101-149



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Alien Plant Species and Forests

❖ Introduced by Forestry

- Alien to Europe 38
- European origin 39
- Alien in Europe (total) 80

❖ Naturalized in forests

- Alien to Europe 310
- European origin 357
- Alien in Europe (total) 668

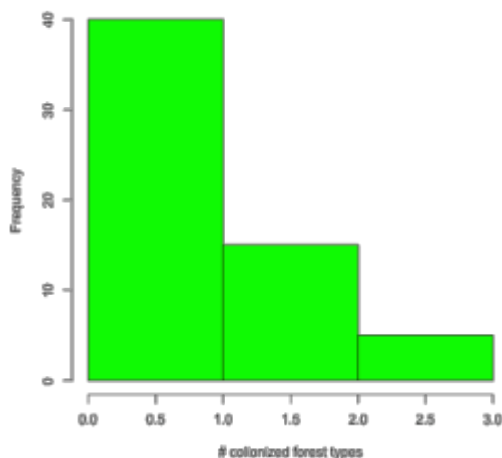
Lambdon et al. (2008) *Preslia* 80: 101-149



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Most species colonise few forest types



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Most “versatile” invasive tree species in Central Europe

- ❖ *Acer negundo*
(ashleaf maple)
planted as ornamental tree
- ❖ *Prunus serotina*
(black cherry)
planted as a forest and park tree
- ❖ *Sorbus latifolia*
(broad-leaved whitebeam)
planted as ornamental tree
in C, N and NW Europe



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Most “versatile” herb species in Central European forests

- ❖ *Impatiens glandulifera*
(Himalayan balsam)
planted as ornamental herb
- ❖ *Impatiens parviflora*
(small-flowered touch-me-not)
spread from Botanic Gardens



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Species of the „EU list“ in forests

- ❖ *Persicaria perfoliata* (mile-a-minute weed)
→ Russia, Turkey
- ❖ *Pueraria montana* (kudzu)
→ Switzerland, Italy, Russia, Ukraine



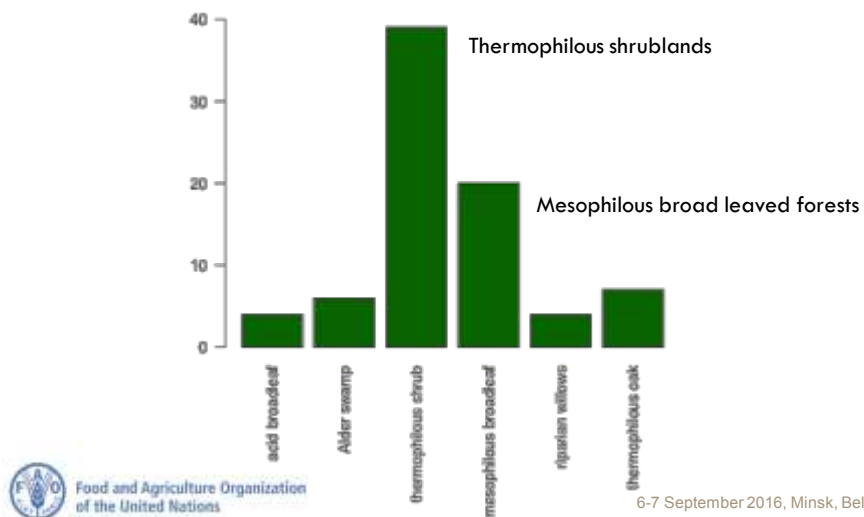
Images: en.wikipedia.org

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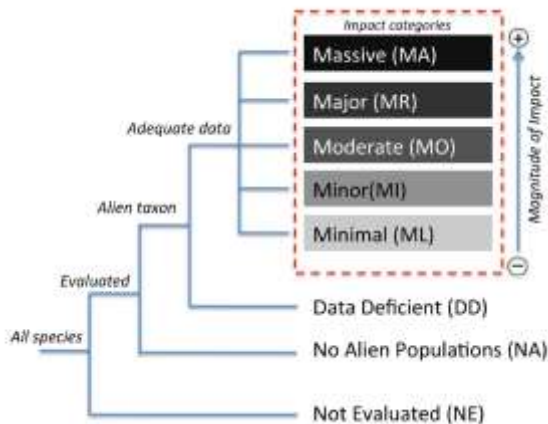
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Few forest types have many alien species



Classifying invasive species

A proposed IUCN Environmental Impact Classification for Alien Taxa (EICAT)



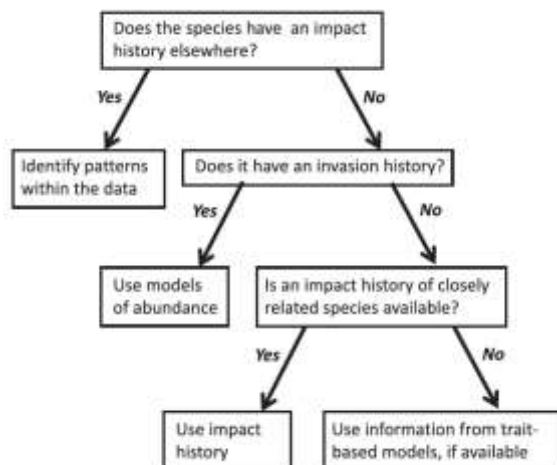
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Blackburn et al. 2014, Plos Biology 12: e1001850

Hawkins et al. 2015, Diversity and Distributions 21: 1360–1363

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Forecasting invasive species



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Kumschick et al. 2015,
BioScience 65: 55-63

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Summary

- ❖ Forestry contributes less to plant invasions than other sectors
- ❖ Levels of forests invasions are intermediate (compared to other habitat types)
- ❖ Despite much local knowledge...
- ❖ ...little synthesized knowledge on
 - regional level (Eastern Europe & West-Asia!)
 - regional forest invasions
 - invaded forest types



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- ❖ EU-Project DAISIE: Delivering Alien Invasive Species Inventories for Europe <http://www.europe-alien.org>, coordinators: P. Hulme, D. Roy
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Thank you for your attention!



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