The impact of invasive alien plant species on species diversity and composition in aquatic communities

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Introduction

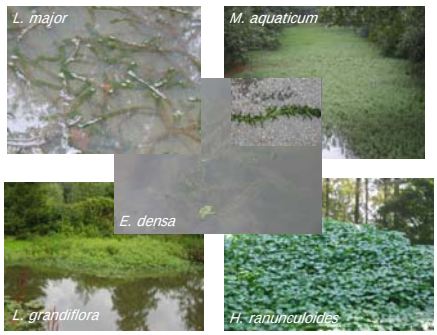


Fig. 2: Studied aquatic alien species

Alien species are non-native or exotic organisms that occur outside their natural adapted ranges and dispersal potential. Some of the alien species become invasive when they are introduced deliberately or unintentionally outside their natural habitats into new areas where they express the capability to establish, invade and outcompete native species.
Invasive species cause loss of biodiversity including species extinctions, and changes in ecosystem functioning. In this context, assessing the effects of invasive nonindigeneous species on native species and ecosystems has become one of the world's most serious conservation issues.

We selected a total of 29 waterbodies in Flanders and Walloon **(Fig. 1)** which were invaded with one of the following aquatic alien species: *Egeria densa, Hydrocotyle ranunculoides*, *Lagarosiphon major*, *Ludwigia grandiflora* or *Myriophyllum aquaticum* **(Fig. 2)**. In each plottype **(Fig. 3a)** relevées were made for the submerged, floating and emergent vegetation, including the percentage cover of alien and native species **(Fig. 3b)**.

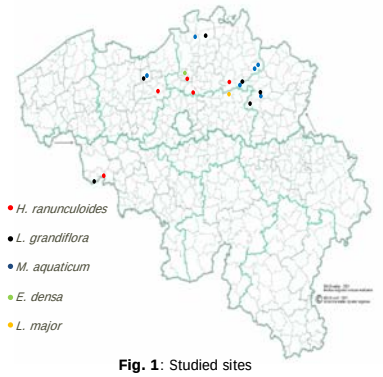
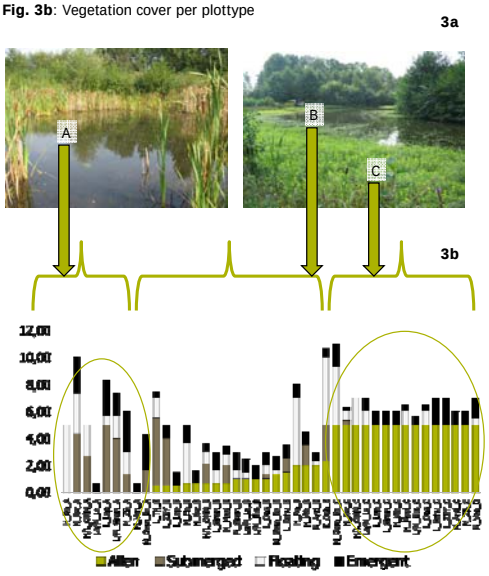


Fig. 1: Studied sites

Results

Fig. 3a: Plottypes identified per site: A plots: plots in uninvaded waterbody; B plots: uninvaded plots in invaded waterbody; C plots: invaded plots in invaded waterbody
Fig. 3b: Vegetation cover per plottype



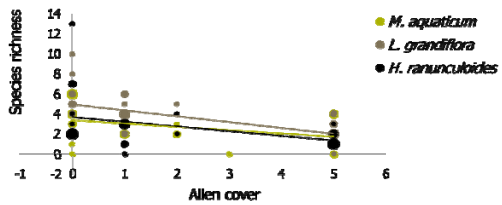
In A plots: presence of submerged macrophytes
In C plots: no submerged macrophytes could be detected

Table 1: Mean species diversity (+/- SD) within each plottype per alien species (*p*-value: ANOVA test)

	A plots	B plots	C plots	*p*-value
L. grandiflora	1.63 (0.43)	1.19 (0.48)	0.70 (0.52)	**0.002**
H. ranunculoides	1.27 (0.76)	0.75 (0.49)	0.35 (0.44)	**0.010**
M. aquaticum	1.10 (0.63)	0.80 (0.41)	0.51(0.52)	0.051

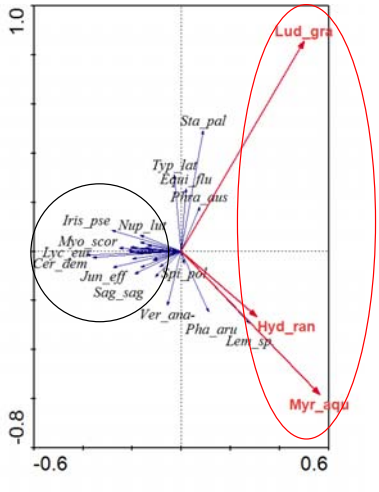
Reduction in mean species diversity with higher degree of invasion of an alien species.

Fig. 4: Mean species richness in function of alien cover for *M. aquaticum* (R = 0.377, $p < 0.05$), *L. grandiflora* (R = 0.578, $p < 0.001$) and *H. ranunculoides* (R = 0.381, $p < 0.05$)



Species richness decreases when alien cover increases for the three alien species

Fig. 5: RDA-ordination diagram with native vegetation data as species variables and alien species data as environmental variables



The three alien species are similar by the explained variation

Clear separation between alien species and native species

Main conclusions

These preliminary results show that invasive alien species have a negative impact (species diversity and composition) on both submerged and emergent macrophytes but the submerged macrophytes suffer the most from the presence of an invasive alien species. The dominance of either one of the three alien species on each level (individual plots, plottypes, ponds) leads to an overall reduction of all native species.

Acknowledgements

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