

The risk of aquarium trade toward introductions of seaweed in European waters

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Seaweeds globally represent one of the largest groups of marine aliens, constituting between 20 and 29% of all marine introduced species in Europe (Schaffelke et al. 2006). Large-scale substitution of dominant native seaweeds with alien species may alter coastal productivity and food web structure, and therefore impact ecosystem services. Only a few impact studies on invasive seaweeds have been carried out worldwide, and these have detected a range of negative ecological effects, with reduction in abundance of native biota being most frequently reported (Williams & Smith 2007).

Database compilations (e.g. Wallentinus 2002) usually rate maritime traffic and aquaculture, in particular oyster cultivation, as main vectors for primary introductions of alien seaweeds to Europe (Wallentinus 2002). The northwestern Pacific origin, as well as time and location of first records, for the large majority of alien species found on Atlantic shores of Europe and Mediterranean lagoons demonstrate the role of oyster imports from East Asia as a vector of introductions (Mineur et al. 2014), which is confirmed experimentally (Mineur et al. 2007). The threat posed by other vectors however has in many cases not been assessed accurately, especially for invasive species from other geographical origins (e.g. Indo-Pacific species found in the Western Mediterranean Sea). Apart from the notorious case of *Caulerpa taxifolia* (Wiedenmann et al. 2001), the role of aquarium trade, that potentially involves a wide range of seaweed species (both as ornamental plants or as hitchhikers), has been largely overlooked for species belonging to other genera.

The main objective of our research is to characterize the risk posed by the European aquarium trade market regarding introduction of potentially invasive species and their possible impact on the European biodiversity. First, we characterized the diversity and magnitude of the European aquarium trade circuit. Second, we sampled the algae diversity encountered in aquaria ranging from private aquarists over shops and wholesalers to public aquaria. Using DNA-barcoding approaches we identified no less than 137 species, of which 15 % are flagged as introduced species. We then estimated the realized temperature niche, using species occurrence data available from OBIS and GBIF and predicted the potential range of these species in Europe by mapping this realized temperature niche on present and future climate conditions. These data are used to identify regions particularly vulnerable toward introductions of aquarium-associated seaweeds.

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