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Alien invasive species leave European mariculture areas aboard pieces of anthropogenic litter

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Areas of mariculture — where marine organisms are cultivated for food — have been identified as important source areas for the dispersal of invasive alien species (IAS) via artificial floating litter. In order to identify IAS at high risk of dispersal via this method, researchers have analysed fouled anthropogenic litter sampled on beaches in two important European mariculture areas. Overall, the team detected eight aquaculture-related IAS attached to anthropogenic litter. All of these species are well adapted to rafting on artificial surfaces and have high potential to disperse in this way, suggesting that they are suitable candidates for closer monitoring and policy action in the future.

Aquaculture is a fast-growing industry that produces one-third of the world's seafood. Mariculture is a type of aquaculture that is particularly important to Europe's economy, with bivalve farming comprising almost half of the EU's aquaculture production. However, regions of aquaculture have been identified as high-risk source areas for the dispersal of IAS on pieces of litter, such as polystyrene floats, plastic rope, food sacks, and buoys[1]. IAS threaten both native and farmed species and marine ecosystems, highlighting a need for further research and management of this emerging threat[2].

A team of scientists set out to identify IAS at high risk of dispersal via floating litter in regions of aquaculture. This research was carried out under the EU-funded Aquainvad-ED project[3]. Sampling was conducted at two key European areas of shellfish mariculture: the Venice lagoon (Italy) and the Algarve region (Portugal). Fouled stranded objects were collected from beaches at each sampling site and categorised as either sea-based or land-based/unknown source. Attached macrobiotic communities were then analysed, and species ascertained via visual identification and genetic barcoding. A total of 22 fouled anthropogenic objects were collected: 91% of these were made of plastics and 64% were categorised as sea-based (mainly relating to aquaculture and fishing).

The survey recorded eight aquaculture-related non-native invasive species attached to anthropogenic litter items, also mostly related to aquaculture. These included the acorn barnacles: the striped barnacle (*Amphibalanus amphitrite*), Darwin's barnacle *(Austrominius modestus*), the triangle barnacle *(Balanus trigonus*), and the barnacle *Hesperibalanus fallax*; the polychaete worms (*Hydroides elegans* and *Hydroides sanctaecrucis*), the Portuguese oyster (*Magallana angulata*), and the moss animal (*Bugula neritina*). Notably, all of these IAS are known as pest species in mariculture. The study also presents the first records of the invasive Portuguese oyster (*M. angulata*) and polychaete worms (*H. sanctaecrucis*), as well as of the native species honeycomb worm (*Sabellaria alveolata*), blue mussel (*Mytilus edulis*), and Montagu's stellate barnacle (*Chthamalus montagui*), on stranded anthropogenic litter.

The IAS recorded in this study present biological traits — such as sessility (attachment to the surface or material on, or from which, an organism lives, grows, or obtains nourishment), filter feeding, and settlement on low-energy surfaces — that make them particularly well adapted to rafting on artificial substrata, which the researchers suggest gives them high potential to disperse via marine anthropogenic litter. As such, they represent promising candidates for future monitoring and policy action. The researchers recommend that particular attention be given to the enhanced opportunities of dispersal and range expansions of IAS due to the increased availability of floating plastics.

Source: Rech, S., Salmina, S., Borrell Pichs, Y. J., & García-Vazquez, E. (2018). Dispersal of alien invasive species on anthropogenic litter from European mariculture areas. *Marine Pollution Bulletin*, 131(A): 10-16. DOI: https://doi.org/10.1016/j.marpolbul.2018.03.038

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1. https://www.sciencedirect.com/science/article/pii/S0025326X17307117

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