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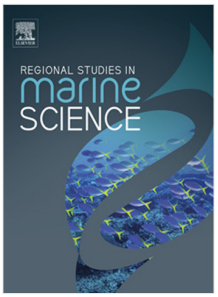

Seasonal patterns of settlement and growth of introduced and native ascidians in bivalve cultures in the Ebro Delta (NE Iberian Peninsula)

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Abstract

Ascidians are important both as invasive species and as a fouling group in artificial marine habitats, causing negative impacts in aquaculture settings and the surrounding environment. The Ebro Delta is one of the major centres of bivalve production in the Mediterranean and is affected by proliferation of ascidian species (mostly introduced forms). Knowledge of the patterns of settlement and growth of the fouling species is mandatory to attempt mitigation measures. Settlement PVC plates were deployed from May to September 2015 at different depths (0.2, 1 and 2 m) in the Ebro Delta oyster aquaculture facilities. The occurrences of all species and the area cover of a selected subset of 6 species were monitored on a monthly basis from June 2015 to December 2016. Fifteen species were found, of which 10 are introduced. There were some differences between the deployed plates and the oyster ropes in species abundance and composition, likely due to differences in substrate complexity. For instance, *Didemnum vexillum* and *Clavelina oblonga* occurred in few plates in contrast to their abundance on oysters. The most abundant species were *Styela plicata* and *Clavelina lepadiformis*, which together with *Ecteinascidia turbinata* showed a preference to grow on plates deployed in May and June. Most of the species grew more at 0.2 m depth than at deeper plates. Thus, to minimise fouling on bivalves, spat immersion during fall and below 1 m depth is recommended. The number of occurrences and cover of the species was found to be similarly informative; suggesting that a periodic monitoring of species occurrence on replicate plates is sufficient for detecting new introduced species as soon as possible and will provide information useful for management.