Subtidal macroalgal succession and competition between the annual, Sargassum horneri, and the perennials, Sargassum patens and Sargassum piluliferum, on an artificial reef in Wakasa Bay, Japan.

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Artificial reefs have been introduced onto the subtidal sandy or rocky bottoms of Japanese coasts, to expand the marine macroalgal beds that enhance the production of commercially important organisms. Previous studies have shown that these artificial reefs were sequentially colonized by annual and perennial macroalgae. However, little is known about the competitive relationship between these annual and perennial species in succession. In the present study, we examined the successional change in macroalgal biomass on an artificial reef in Wakasa Bay, Japan, and tested the effects of removing of annual and perennial species on the thallus length of successional perennial and annual species, respectively. The reef introduced between March and April 2008 was dominated by the annual brown alga *Sphaerotrichia divaricata* in July 2008, the annual brown alga *Sargassum horneri* in March 2009, and the perennial spcies *Sargassum patens* and *S. piluliferum* in February 2010. The removal of *S. horneri* during autumn 2008 resulted in an increased thallus length in *S. patens*/*S. piluliferum* in March 2009, but had no effect in February 2010. Similarly, the removal of *S. patens*/*S. piluliferum* during autumn 2008 resulted in an increased thallus length in *S. horneri* in March 2009, but had no effect in February 2010. These results suggest that *S. horneri* and *S. patens*/*S. piluliferum* have a negative effect on the growth of each other in the first year of colonization, although the presence of *S. horneri* in the first year seems to have a minimal effect on the dominance of *S. patens*/*S. piluliferum* in the second year.

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