Pseudoalteromonas spp. Serve as Initial Bacterial Attractants in Mesocosms of Coastal Waters but Have Subsequent Antifouling Capacity in Mesocosms and when Embedded in Paint - DTU Orbit (06/12/2018)

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The purpose of the present study was to determine if the monoculture antifouling effect of several pigmented pseudoalteromonads was retained in in vitro mesocosm systems using natural coastal seawater and when the bacteria were embedded in paint used on surfaces submerged in coastal waters. Pseudoalteromonas piscicida survived on a steel surface and retained antifouling activity for at least 53 days in sterile seawater, whereas P. tunicata survived and had antifouling activity for only 1 week. However, during the first week, all Pseudoalteromonas strains facilitated rather than prevented bacterial attachment when used to coat stainless steel surfaces and submerged in mesocosms with natural seawater. The bacterial density on surfaces coated with sterile growth medium was 105 cells/cm² after 7 days, whereas counts on surfaces precoated with Pseudoalteromonas were significantly higher, at 106 to 108 cells/cm². However, after 53 days, seven of eight Pseudoalteromonas strains had reduced total bacterial adhesion compared to the control. P. piscicida, P. antarctica, and P. ulvae remained on the surface, at levels similar to those in the initial coating, whereas P. tunicata could not be detected. Larger fouling organisms were observed on all plates precoated with Pseudoalteromonas; however, plates coated only with sterile growth medium were dominated by a bacterial biofilm. Suspensions of a P. piscicida strain and a P. tunicata strain were incorporated into ship paints (Hempasil x3 87500 and Hempasil 77500) used on plates that were placed at the Hempel A/S test site in Jyllinge Harbor. For the first 4 months, no differences were observed between control plates and tested plates, but after 5 to 6 months, the control plates were more fouled than the plates with pseudoalteromonad-based paint. Our study demonstrates that no single laboratory assay can predict antifouling effects and that a combination of laboratory and real-life methods must be used to determine the potential antifouling capability of new agents or organisms.

General information
State: Published
Organisations: National Food Institute, Division of Industrial Food Research, Department of Systems Biology, Bacterial Ecophysiology and Biotechnology, Hempel A/S
Contributors: Bernbom, N., Ng, Y., Møller, S., Gram, L.
Pages: 6885-6893
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Applied and Environmental Microbiology
Volume: 79
Issue number: 22
ISSN (Print): 0099-2240
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 3.99
Web of Science (2017): Impact factor 3.633
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 4.08
Web of Science (2016): Impact factor 3.807
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 4.14 SJR 1.891 SNIP 1.308
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 4.02 SJR 1.857 SNIP 1.384
Web of Science (2014): Impact factor 3.668
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 4.25 SJR 1.899 SNIP 1.414
Web of Science (2013): Impact factor 3.952