11TH U.S. SYMPOSIUM ON HARMFUL ALGAE

IMPACTS OF ALEXANDRIUM MONILATUM AND MARGALEFIDINIUM POLYKRIKOIDES ON OYSTERS IN LOWER CHESAPEAKE BAY

Blooms of Margalefidinium (formerly Cochlodinium) polykrikoides and Alexandrium monilatum occur most years in late summer in lower Chesapeake Bay, however reported impacts vary with year and location. Local shellfish aquaculturists have reported oyster mortalities during and immediately following these blooms some years. This prompted us to conduct field studies with juvenile oysters to study the effects of blooms and other stressors at control and bloom-impacted aquaculture sites that differ in grow-out approaches and physical environmental characteristics with an aim toward identifying mitigation strategies. Oysters exposed to blooms experienced higher mortality and reduced growth during and immediately following the blooms. Growth rate slowed after bloom onset and generalized linear models indicated that growth rate is higher when concentrations of M. polykrikoides and A. monilatum are lower. The toxin goniodomin A (GDA) produced by A. monilatum was found in the tissues of field-deployed oysters during the late summer. Concentrations were highest during and immediately following A. monilatum blooms. Levels of GDA in oyster tissues decreased about a month after the blooms. Bioassays on larval oysters demonstrated 80-100% mortality at concentrations > 1,000 cells/ml of York River, VA cultures of A. monilatum and M. polykrikoides after 72 hr of exposure. Rapid mortality (i.e. <24 hr) was observed in bioassays with larval oysters exposed to purified GDA at a concentration of 1ug/ml. Slightly older oyster spat (5mm) suffered 100% mortality when exposed to A. monilatum cell concentrations of 2,000 cells/ml or greater for 72 hrs, although no mortality was observed when spat were exposed to M. polykrikoides at a concentration of 4,300 cells/ml. Gill and mantle architecture was eroded in oysters exposed to the York River A. monilatum culture and in oysters exposed to blooms in the field.

KIMBERLY REECE, PROFESSOR | VIRGINIA INSTITUTE OF MARINE SCIENCE

Reece is a Professor and the current Chair of the Aquatic Health Sciences Department at the Virginia Institute of Marine Science. She conducts molecular genetic studies on aquacultured shellfish species and aquatic pathogens of humans and shellfish. A primary focus of her research is monitoring for, molecular detection of, and examining the biological impacts of harmful algal bloom (HAB) species. A key component is the development and optimization of molecular diagnostics for viral, bacterial, and protistan organisms, including HABs, in environmental matrices such as marine and estuarine water and sediments, and in shellfish. Molecular genetic tools are used to do source tracking, transmission studies and ecological experiments.

KREECE@VIMS.EDU

Co-Authors:

Ryan B. Carnegie1, Todd A. Egerton2, Robert J. Latour1, Sarah K.D. Pease1, William J. Reay1, Amanda Roach2, Clara L. Robison1, Gail P. Scott1, Hamish J. Small1, Margaret Smigo2, Juliette L. Smith1, Wolfgang K. Vogelbein1, Adam Wood2, Evan Yeargan2

1Virginia Institute of Marine Science, William & Mary, 1370 Greate Rd., Gloucester Point, VA 23062

2Virginia Department of Health, Division of Shellfish Safety and Waterborne Hazards, Richmond and Norfolk, VA