Mitigation of Florida Red Tide (Karenia brevis) Blooms through Flocculation with Enhanced Local Sediments

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This research explores the use of naturally sourced sediments as a base for flocculants to mitigate Florida red tide (Karenia brevis) blooms. Flocculation is the process of removing Karenia from the water column by using surface charges and ballast to form flocs that fall to the seafloor and eventually die. Sand collected from Barefoot Beach along with silt collected from Spring Creek were analyzed as potential alternatives to outsourced clays. Two enhancers, polyaluminum chloride (PAC) and chitosan, were added to the local sediments for increased bridging between the flocs and faster sedimentation. While hypothesized that enhanced local silts would flocculate more effectively than enhanced local sands, both local sediments outperformed the outsourced clay in three ways. First, enhanced local sediments (ELS) were able to flocculate Karenia cells more efficiently than clays immediately after flocculation and in the 10-day period that followed. Second, ELS were able to retain cells within flocs for a 10-day period at the same effectiveness as outsourced clays, and produce larger flocs. Third, in a 7-day reculture experiment following the initial trial, the clay-treated Karenia cells grew at an exponential rate, however the cells from the ELS-treated groups did not grow at any measurable rate. All 3 of these data sets are statistically significant ($p<0.05$) using a Linear Mixed-Model Analysis. While preliminary in nature, this research shows conclusive evidence that enhanced local soils are an inexpensive, readily available, and more effective alternative to expensive, outsourced clays as a mitigation technique for Florida red tide (Karenia brevis) blooms.

Awards Won:
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