Aqua Info
AQUACULTURE NOTES

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Hydrated Lime Application by the Shellfish Industry

Background

Hydrated lime is used in both the mussel and oyster aquaculture industries for controlling predators and fouling organisms that impact the culture of shellfish. Fouling organisms that are controlled with the use of lime include starfish, tunicates, bryozoans and hydroids. In the PEI shellfish industry, hydrated lime is mixed with seawater to create a suspension at an approximate concentration of 4%. This is the equivalent of 40 g of hydrated lime in 960 mL of seawater. The lime/seawater suspension is highly alkaline with a pH of approximately 12.7.

Use in the Mussel Industry

Hydrated lime suspension is applied as either an immersion treatment or by spraying it onto crop and gear. For the immersion method, mussel seed collectors are immersed in the lime solution for approximately 30 seconds in large troughs that are attached to the side of mussel boats (see Figure 1).

Figure 1. Mussel seed collectors being treated with hydrated lime solution.

The spray method is utilized primarily on grow-out mussel socks and is currently the standard industry method used for the control of *Styela clava* fouling (see Figure 2). The suspension is lightly sprayed on the socks as they are lifted from the water. Mussel socks are typically only treated once during the growing season, beginning in August.

Figure 2. Lime spray system being used to control clubbed tunicate, *S. clava,* fouling on mussel socks.

Use in the Oyster Industry

The PEI oyster industry utilizes a hydrated lime suspension to treat for pests and predators; such as bryozoans, algae, tunicates and starfish on oyster collectors using the immersion technique. Collectors are often treated shortly after oyster larvae have set (typically July) and repeat treatments may be applied, if required, to reduce fouling. Oysters are also dipped in a lime and 30% salt solution prior to the movement to another body of water to minimize the risk of an unintentional transfer of an aquatic invasive species.

Prince Edward Island CANADA
Fisheries, Aquaculture and Rural Development

Hydrated Lime & the Production of Lime

Hydrated lime is used in many applications including water and waste treatment, soil stabilization, agricultural applications, asphalt modification and applications in the food industry. It has also been used to reduce acidification in lakes and ponds.

The production of lime begins with the burning of limestone (sedimentary rock formed by the compaction of the remains of coral animals and plants) to form quicklime. Hydrated lime is produced by adding water to the quicklime. Carbon dioxide (atmospheric or industrial) reacts with hydrated lime to convert it back to limestone (calcium carbonate).

Potential Environmental Impact Evaluation

Studies completed over multiple years show that the footprint of hydrated lime application is very small with respect to water quality and benthic impacts. The pH of the hydrated lime solution in mixing tanks on the boats is greater than 12, but during application it is rapidly reduced to ambient levels in the environment (see Figure 3). Beneath lime application sites, divers observed that benthic organisms were undisturbed and there was no evidence of accumulation of limestone on the bottom sediments.

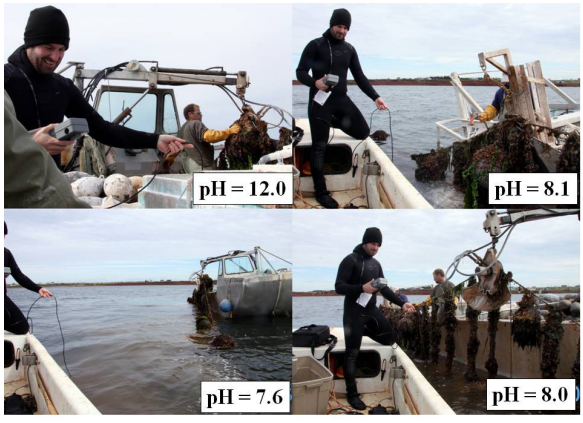

Figure 3. DFARD staff measuring pH at varying distances from a liming operation. Clockwise from top left: tank with lime solution, 1 m away from application site, 3 m away from application site, and greater than 10 m away from application site.

In field studies, sticklebacks, sand shrimp, rock crabs, rock weed, starfish, mussels and oysters were all subjected to hydrated lime suspensions under realistic conditions and exposures (see Figure 4). In all cases there was either no mortality or comparable mortality to the untreated control subjects. Laboratory studies by Fisheries and Oceans Canada and Environment Canada showed that sticklebacks, sand shrimp and lobster larvae exposed to a pH greater than 9 for a 96 hour period would result in 50% mortality. However, the water quality results show that the pH rapidly decreases from above 12 to less than 9 within the first metre of the application site. Therefore, hydrated lime application is not expected to cause any significant harm to non-target organisms.

Figure 4. Experimental animals being subjected to a hydrated lime solution from an aquaculture operation.

Conclusion

Hydrated lime is used to reduce the impact of fouling and predatory organisms on shellfish in PEI. The use of hydrated lime, at the current application rate, has not shown to have a negative impact on water quality, the benthic environment or to non-target organisms.

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