Effectiveness of EarthTec® QZ, a Copper-Based Product, for Adult and Larval Dreissenid Mussel Control

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Background

Veligers can attach to water intake pipes and clog them!

Water intake pipe

Prechlorination, the most common mussel control method

Chlorine diffuser

Live mussel larvae (veligers)

Kills adults after long exposures

Forms chlorinated disinfection by-products (DBPs), which are heavily regulated

Decays

EarthTec® QZ, a copper-based product as an alternative

Copper diffuser

Dead veligers

Toxic towards mussels

Does not form chlorinated DBPs

Long-lasting

Materials and Methods

Determination of Adult and Veliger Mortality

Unchlorinated raw water from a water treatment plant was diverted to a pilot system that allows individual chemical dosing of twelve different streams. Each stream feeds a biobox, or flow-through aquarium, that emulates intake pipe conditions. Copper concentrations ranging from 0 to 500 µg/L were tested.

Veliger Behaviour Assessment

Veligers were exposed to 500 µg/L of copper and to 1 mg/L total chlorine and their behavioural response was compared to a control. Veligers were observed in the microscope to assess behavioural changes. Four qualitative and non-standardised categories of behaviour were proposed and veligers were allocated into one of those categories.

Veligers were held in tubes with a 64 µm mesh on both sides. The tubes were inside bioboxes.

Adult mussels were kept in plastic mesh baskets inside bioboxes.

Cross-Polarized Light Microscopy (CPLM) for Veliger Assessments

Veliger viewed through conventional microscopy

Veliger viewed with CPLM

Results

Objectives

1. To determine if the product can effectively kill adult and larval dreissenids

2. To evaluate if the copper-based product has an effect on dreissenid veliger behaviour

Unchlorinated raw water from a water treatment plant was diverted to a pilot system that allows individual chemical dosing of twelve different streams. Each stream feeds a biobox, or flow-through aquarium, that emulates intake pipe conditions. Copper concentrations ranging from 0 to 500 µg/L were tested.

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Conclusions

• The product was effective for killing veligers and adult mussels, thus it could be used as a proactive and as a reactive mussel control method.
• The product was more effective than chlorine for killing adult mussels.
• The product did not affect veliger behaviour, which suggests that mussels do not perceive the product as noxious. Veligers could be filtering at normal rates, but the copper would accumulate in their bodies, eventually causing death.

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References