Examining Disinfection Methods of Artemia nauplii

Lucia Yannuzzi; Dr. John Stieglitz
Rosenstiel School of Marine and Atmospheric Sciences, University of Miami, FL

Introduction

- With aquaculture operations projected to double by 2030 to meet the needs future human populations, research on pathogens that plague aquaculture has never been so pertinent (Acosta F. et al. 2020)
- Used commonly among first feeds for larval fish, Artemia salina are easily mass-produced, low-cost, and easy to enrich, but are prone to becoming vectors of Vibrio
- If ingested by larval fish, Vibrio can cause:
  - Occular lesions + Blindness
  - Muscle necrosis
  - Tail Rot
  - Mortality
- Hatcheries often implement a disinfection before feeding them to the fish larvae
- Based on extensive research, the following chemicals were selected:
  - Virkon® Aquatic
  - Hydrogen Peroxide [35%]

Methods

Hydrogen Peroxide Trial 1

- Harvest Artemia cysts for 24 hours with sterilized scawater
- Place 0.1 ml samples of disinfected Artemia water
- Rinse disinfected Artemia with sterilized scawater
- Rinse disinfected Artemia in harvesting bucket with sterile scawater
- Harvest Artemia collect cysts with magnets in harvesting bucket
- Place 0.1 ml samples of disinfected Artemia water
- Rinse disinfected Artemia with sterilized scawater
- Rinse disinfected Artemia in harvesting bucket with sterile scawater
- Harvest Artemia collect cysts with magnets in harvesting bucket

Dosage of Hydrogen Peroxide vs. Number of Colony Forming Units (CFU's)

Hydrogen Peroxide Dosage (ppm)

0 5 7.5 12.5

Number of Colony Forming Units (CFU's)

0 5 10 15 20

Results

Dosage of Virkon vs. Number of Colony Forming Units (CFU's)

Virkon Dosage (ppm)

0 5 7.5 12.5

Number of Colony Forming Units (CFU's)

0 5 10 15 20

Figure 7: Hydrogen Peroxide Trial 1

- The first trial using hydrogen peroxide revealed a negative relationship between dosage of hydrogen peroxide added and number of CFU’s observed

Figure 8: Hydrogen Peroxide Trial 2

- The second trial using hydrogen peroxide yielded fewer colonies overall but maintained the negative relationship between added hydrogen peroxide and number of CFU’s

Figure 9: Virkon Trial

- In Virkon trial, colonies were only observed within one dosage, ultimately preventing the analysis of any trend. Trials will be continued to analyze the impact on CFU’s

Conclusion

- In the first trial for hydrogen peroxide (Fig. 7), the presence of hydrogen peroxide generally reduced the amount of CFU’s
- The second hydrogen peroxide trial (Fig. 8) did not present as many colonies, but maintained the negative relationship between hydrogen peroxide dosage and number of colony forming units
- In the Virkon trial (Fig. 9), the only colonies present were in the presence of the highest concentration, thus rendering any analysis inconclusive
- More trials of Virkon are needed to confirm the impact on CFU’s
- Bacterial plating is known to be very variable. To strengthen negative trends of CFU’s in the presence of disinfectants, trials will be continued to strengthen trends
- Both Hydrogen Peroxide and Virkon are easily accessible and low-cost, making them ideal disinfectants for commercial aquaculture operations
- Neither disinfectant was observed to have any impact on Artemia survival; as any mortality would be unacceptable in aquaculture operations

Acknowledgements

I would like to thank Dr. Stieglitz, Dr. Merly, Ron Hoenig, Jack Colman, Haley Lasco, and Joey Sanchez for their assistance throughout the experiments

References