

STRATEGIES

for

Nitrogen Control in Zero to Limited Water Exchange Shallow Water Indoor Nursery Systems

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Production Trial Objectives

To produce the maximum number of juveniles *Litopenaeus vannamei* juveniles to stock a stacked raceway system in limited water volume.

To limit toxic TAN and NO₂ levels through rapid establishment of nitrifying bacteria.

To evaluate NO₃-N control by dilution.

Premise

Nitrifying bacteria found naturally will not establish a population rapidly enough to control TAN and NO₂ to desired levels in high density culture systems.

Solutions

An inoculum from an established culture systems, can be used to get a population of nitrifying bacteria more rapidly started in a new system.¹

Application of commercial nitrification inoculants to rapidly establish nitrifying bacteria.¹ (Yoram Avnimelech, 2009)

Potential Solution

Evaluate commercial nitrifying bacteria inoculants.

Fritz Industries, Inc., a company that specializes in water treatment products for both aquaria and water treatment systems, provides nitrifying bacteria FritzZyme® TurboStart® 900, a consortium of marine nitrifying bacteria, was recommended.

Production Cycle NRS11-07

Four 1.5 m square tanks were filled with seawater to a depth of 20 cm. They were stocked with PL12 *Litopenaeus vannamei* from SIS.

Two tanks had a density of 19,445/m³ (3,889/m²).
Two tanks had a density of 38,890/m³ (7,778/m²).

TAN, pH, alkalinity, NO²-N, NO³-N, and settleable solids were monitored on a daily basis.

Usage of Nitrifying Bacteria

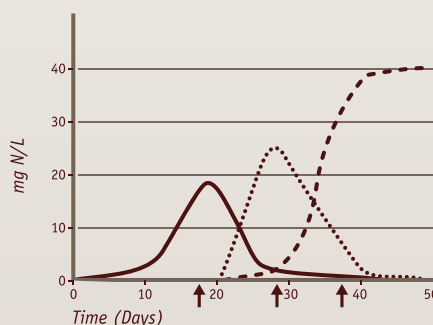
During this production trial the average amount of TurboStart® used per tank during the first 8 days was 551.25 ml.

During this period a colony of nitrifying bacteria was established. The average number of juveniles harvested per tank was 26,778.

The average amount of TurboStart per juvenile harvested was .0206 ml during the first 8 days.

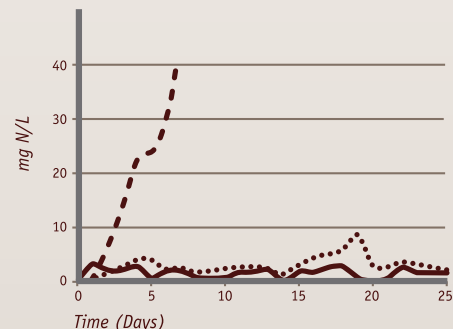


Comparison of Non-Inoculated And Nitrifying Bacteria Inoculated Systems



Data from experimental pond, Dor, Israel.
From: Y. Avnimelech 2009. Biofloc Technology

— NH₄ NO₂ - - - NO₃



NRS 11-07

— Mean TAN Mean NO₂-N - - - Mean NO₃-N

CONCLUSIONS

Juvenile production (>34,000/m³) in low water volumes with good survival was obtained.

Nitrifying bacteria inoculum greatly reduced intensity and duration of TAN and NO₂-N.

Water exchange to dilute NO₃-N is a short term temporary remedy.

Removal of water and biofloc caused an increase of NO₂-N.

More work on control of NO₃-N in autotrophic biofloc systems is required.

