

Effects of Inorganic and Organic Fertilization on Physicochemical Parameters, Bacterial Concentrations, and Shrimp Growth in *Litopenaeus vannamei* Cultures with Zero Water Exchange

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Abstract

To identify ways to improve water quality and shrimp production in closed systems, two parallel experiments (one in tanks and one in ponds) were conducted using Pacific white shrimp, *Litopenaeus vannamei*, cultures. In both experiments, the effects of inorganic (Nutrilake®) and organic (molasses) fertilization on physicochemical parameters, bacterial concentrations, and shrimp performance under zero water exchange were evaluated. Fertilization with both molasses and Nutrilake enhanced the feed conversion rate, as well as shrimp survival and production. In tanks, the shrimp survival and production rates were highest in the molasses treatment, but this effect was not observed in ponds. In ponds, fertilization with Nutrilake increased nitrogen and phosphorus concentrations more than did the controls and molasses treatments toward the end of the experiment. In tanks, fertilization with molasses reduced ammonia concentrations toward the end of the experiment, but the same effect was not observed in ponds. In ponds, fertilization reduced the proportion of *Vibrio* spp. bacteria, which most likely reduced the incidence of disease from these potentially pathogenic organisms. In both culture systems, fertilization increased the proportion of *Bacillus* spp., which most likely enhanced food availability.

Shrimp farming is a major industry in tropical and subtropical areas around the world.

According to industry sources, the global production of aquaculture shrimp was estimated at 2.3 million m.t. in 2011 (FAO-Globefish 2012). However, pollution, environmental degradation,

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