

عنوان مقاله:

Marine sponge symbiotic bacterial bioremediation against heavy metal pollutants in tiger prawns; Penaeus monodon culture medium

محل انتشار:

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خلاصه مقاله:

BACKGROUND AND OBJECTIVES: The quality and production volume of the cultivation of tiger prawn *Penaeus monodon* have decreased

considerably in the last two decades. However, intensification and extensification efforts, including the application of cultivation technology through pond land recovery, have not produced expected results. Visible symptoms suggest potential issues with the cultivation water possibly originating from exposure to heavy metal pollutants. Therefore, this study aimed to remove heavy metal pollutants by using sponge symbiont bacteria bioremediators to increase the survival rate and quality of tiger prawn production. The achievements of this research are expected to contribute to the scientific development of environmental microbiology, bioremediation, and aquaculture pollution control. METHODS: The study utilized *Bacillus pumilus* and *Pseudomonas stutzeri* bacteria. The water used for tiger prawn post-larvae cultivation was treated with these bioremediator bacteria. The water had copper and lead ion concentrations that were ۲۰ times greater than the maximum threshold value. The physical and chemical characteristics and parameters, such as dissolved organic matter, nitrite, nitrate, and ammonia contents, of the cultivation water were monitored over a ۳۰-day period. The specific growth rate in terms of weight and body length and the survival rate of the tiger shrimps were measured to evaluate the effect of the bioremediation process on the prawns. The concentrations of copper and lead ions in the cultivation water and within the body of the tiger shrimps were analyzed. The health of the tiger prawns was evaluated by observing signs of tissue damage. FINDINGS: Among all the treatments, Treatment I with copper ion exposure had the highest average specific growth rate of the tiger prawns in terms of weight and body length, followed by Treatment II with lead ion exposure and Treatment III with a combination of both pollutants (the lowest). The intersection of copper and lead ion concentrations in the tiger prawns and cultivation media occurred in the cultivation period of ۱۵-۲۰ days. The use of *Bacillus pumilus* and *Pseudomonas stutzeri* bacteria as bioremediators effectively remediated the copper and lead pollutants at an average of ۹۹.۳۴ percent and ۹۷.۱۸ percent of the initial concentration, respectively. Despite the bioremediation efforts, the tiger shrimps exhibited symptoms of tissue damage in the head, tail, and shell. These symptoms included necrosis, myopathy, and infiltration, which are ... indicative of decreased cell function due to the p

کلمات کلیدی:

Bioremediation, Cultivation media, Heavy metal pollutants, Sponge symbiont bacteria, Tiger prawns

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