

DISSERTATION INFORMATION

Title: **Study on Biodiversity of bacterial strains capable of improving water quality of commercial catfish ponds (*Pangasianodon hypophthalmus*) in Mekong Delta**

Major: **Biotechnology**

Major code: **62.42.80.05**

PhD Student: **Bui Hong QUAN**

Scientific Supervisor: **Assoc.Prof. Nguyen Duc LUONG**

Traning Institution: **Ho Chi Minh City of University of Technology, Vietnam National University HCMC**

NỘI DUNG

Pangasius (*Pangasianodon hypophthalmus*) is one of the most popular commercial fish species in the Mekong Delta. Water quality in pangasius farming affects not only the fish but also all the organisms associated with the water source. In order to maintain the water quality of catfish ponds, fish farmers in the Mekong Delta often change the water and periodically drain the sediment. Water from outside can carry pathogens into the pond and the discharge of wastewater contaminates the surrounding areas. Research on using microorganisms to improve water quality has become an inevitable trend of sustainable aquaculture. Microorganisms remove nitrogen from the environment, remove H₂S, biosynthesize enzymes, and bioflocculants, which reduce pollution and improve water quality. Currently, there are not many studies on the diversity of bacteria capable of improving water quality in commercial catfish ponds in the Mekong Delta. Therefore, the objective of this study was to isolate and determine the biodiversity of bacterial species from commercial pangasius ponds in the Mekong Delta. Outstanding activity strains have had their biomass recovery optimized through optimization of their culture media ingredients and their culture conditions using Packett-Burman matrix and Response Surface Methodology (RSM) – Central Composite Design (CCD).

The results of this study have brought new contributions as follows:

1. It has been determined that in the sediment samples of commercial pangasius ponds in the Mekong Delta, there are diverse presences of 38 genera, 27 families, 16 orders, and 5 phyla;

of which 3 common phyla are Actinobacteria, Firmicutes and Proteobacteria. The diverse and multiple activities are shown as: 36 strains capable of TAN metabolization in aerobic conditions were classified into 17 genera of 3 phyla; 9 strains that metabolize inorganic nitrogen compounds under anaerobic conditions were classified into 6 genera of 1 phylum; 11 H₂S-reducing strains were classified into 6 genera of 2 phyla; 24 strains capable of synthesizing biofloculants were classified into 10 genera of 4 phyla; 9 strains synthesizing proteases were classified into 8 genera of 2 phyla; 17 strains synthesizing amylases were classified into 6 genera of 3 phyla; 21 cellulase biosynthetic strains belonged to 7 genera of 2 phyla; and 21 lipase biosynthetic strains are classified into 9 genera of 2 phyla.

2. Many bacterial strains were first identified in commercial pangasius ponds, including 28 species of *Paenibacillus*, 4 species of *Bacillus*, etc.
3. Some bacterial strains were first identified with their decomposing activity in catfish pond sediment such as *Paenibacillus* (TAN metabolization in aerobic conditions), heterotrophic bacteria capable of anaerobic metabolization of inorganic nitrogen compounds, and H₂S-reducing bacteria.
4. Seven strains which show outstanding capabilities in improving water quality of commercial pangasius ponds (including NH5 *Nitrosomonas marina*, H₂SB115 *Xanthomonas bromium*, PO2 *Bacillus ehimensis*, PR5 *B.amyloliquefaciens*, EP6 *Paenibacillus humicus*; EC13 *Pantoea eucalypti*, and EL6 *Paenibacillus polymyxa*) have had their biomass recovery optimized through optimization of their culture media and culture conditions.

Scientific supervisor



Assoc.Prof. Nguyen Duc LUONG

PhD. Student



Bui Hong QUAN