

**FINAL REPORT**  
**e-Science No. SCF0066**

**DEVELOPING VACCINE AGAINST VIBRIOSIS  
IN MARINE FISH**

**Prepared By**  
**DR. JULIAN RANSANGAN**

**BORNEO MARINE RESEARCH INSTITUTE**  
**UNIVERSITI MALAYSIA SABAH**



**UMS**  
UNIVERSITI MALAYSIA SABAH

## EXECUTIVE SUMMARY

One of the major causes of economic loss in aquaculture of marine fish is the bacterial infection. A number of bacterial pathogens which include *Vibrio* sp., *Streptococcus* sp. and *Photobacterium* sp. have been reported to affect aquaculture fish in Sabah. However, no vaccines for combating these bacterial pathogens are currently available. The present study was conducted with the aims to develop the vaccine against one of these bacterial pathogens. The first part of this study was the identification of bacterial pathogens which are associated with diseased fish collected from aquaculture farms around Sabah. In addition to isolation, identification and characterization, pathogenicity of each bacterial strain was also determined. The finding from the study was taken as the basis for vaccine development. In this study, *Vibrio harveyi* was found to be highly virulent to many species of cultured fish. Subsequently, the virulent strain of *V. harveyi* was killed using formalin and served as bacterin. The ability of the bacterin to induce immune response was first tested in several fish species including freshwater and seawater fish species. The immune response was evaluated using agglutination test. The result showed that all the fish administrated with the bacterin developed antibody against the live antigen. The bacterin was further tested on Asian seabass using two different delivery methods. The two methods included injection and hyperosmotic-treatment. The fish specimens were divided into three groups namely the non-booster, one time booster and two times booster. Next, the fish in every group was challenged using the bacterial pathogen through intraperitoneal injection. Among the methods of delivery, the injection with adjuvant provided the best protection, whereas the immersion with hyperosmotic-pretreatment (HI) resulted in no protection when tested at high lethal dosage (LD<sub>100</sub>). Both injection methods; adjuvant and non-adjuvant, provided relatively strong protection when challenged with LD<sub>60</sub> with RPS value of more than 80%. *V. harveyi* bacterin was found useful for vaccine preparation as it has effectively prevented vibriosis in Asian seabass. The finding also showed that vaccination through injection yielded better protection than immersion. Apart from positive outcome of the vaccine trials, vaccinated fish were found exhibiting other clinical signs of bacterial infection. Further analysis revealed the presence of another bacterial pathogen, *Photobacterium damsela* that complicated the result of vaccination trail against vibriosis. The second part of the study was the investigation of possible use of crude extract from plants as the alternative treatment for bacterial diseases. The result of the study revealed several commonly grown plants in Sabah including the *Piper betle*, *Phyllanthus niruri* and *Syzygium aromaticum* exhibited antibacterial properties against many aquaculture bacterial pathogens including the *V. harveyi* and *Photobacterium damsela*. The antibacterial properties of these plants were also found photosensitive. Besides vaccination, the extracts from these plants may be useful for alternative remedy of bacterial diseases in aquaculture with minimal environmental effects.