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Critical better management practices and critical bio-security measures for prevention of entry and spread of white spot virus and pathogenic *Vibrio* in grow-out farms of cultured *Penaeus monodon* in Sri Lanka

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Abstract Since the first record of white spot disease (WSD) in 1996, PCR tested, white spot virus (WSV) free post larvae of *Penaeus monodon* (Fabricius 1798) are stocked in grow-out farms as the major bio-security measure. However, significantly high mortality in young shrimp and total rejection of harvest have been recorded in North Western Province, Sri Lanka due to WSD and/or vibriosis. Present study was planned to identify critical better management practices (CBMPs) and critical bio-security measures (CBSMs) that should be strictly adopted to prevent the entry and spread of WSV and pathogenic *Vibrio* in grow-out farms of *P. monodon*. A questionnaire survey, carried out at randomly selected 100 grow-out farms located in the North Western Province, revealed that there was a relationship between the occurrence of WSD and /or vibriosis and levels of practicing better management practices (BMPs) and/or bio-security measures (BSMs). Proper pre-stocking pond preparation, adoption of zero water exchange, monitoring and controlling water quality parameters including pathogenic *Vibrio* in culture water and use of a suitable bioaugmenter and a probiotic were identified as the CBMPs while proper disinfection of culture water, stocking of WSV and MBV free post larvae and prevention of WSV contamination through other routes over the rearing period were the identified CBSMs. Entry and spread of WSV and pathogenic *Vibrio* in *P. monodon* grow-out farms in the North Western Province, Sri Lanka could be prevented by strict adoption of CBMPs and CBSMs identified during the present study.

Keywords: *Penaeus monodon*, white spot disease, vibriosis, bioaugmenter/probiotic, Sri Lanka

INTRODUCTION

The shrimp farming generates export earnings with tremendous employment opportunities, and has a great potential for further development in Asia (Subasinghe 2015; Thitamadee et al. 2016). Epizootics of both infectious and non-infectious etiology have continuously plagued both production systems (hatchery system and grow-out system) of the shrimp farming industry (Walker and Mohan 2009). Diseases caused by viruses, bacteria, fungi and parasites are considered to be very important in shrimp culture (Lightner 2003).

Among the recorded pathogenic viruses, white spot virus (WSV), the etiological agent of white spot disease (WSD) is the most serious pathogen in terms of overall production losses because it is lethal for all cultivated shrimp species and as the disease causes rapid and high mortality (Flegel 2006). *Vibrio* species, the most important pathogenic bacteria affects shrimp in both hatchery and grow-out systems and causes chronic or mass mortalities and shell deformities reducing marketability of shrimp (Lavilla-Pitogo et al.1990). Common pathogenic *Vibrio* species both in *P. monodon* hatchery and grow-out systems in the North Western Province, Sri Lanka have been isolated and identified (Kumara 2016; Kumara and Hettiarachchi 2016, 2017).

The most obvious way to prevent a disease is to keep the pathogenic organism out of the farming system (Lightner 2005). In order to evaluate the possibility of such a control strategy, it is necessary to first examine the possible routes by which the pathogen can enter the rearing system of shrimp. Better management practices (BMPs) and bio-