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Identification of *Enterocytozoon hepatopenaei* (EHP) carrier species in shrimp pond environment in Northwestern province of Sri Lanka

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Abstract

Enterocytozoon hepatopenaei (EHP) is an emerging disease of farmed shrimp in Sri Lanka caused by a microsporidian fungal parasite. Stunted growth, soft shells, lethargy, and white faeces are the common symptoms of the infected animals. The spread of this microsporidian parasite may primarily be associated with the presence of macrofauna that serves as carriers of EHP. The comprehensive evaluation of EHP in potential macro fauna carriers was carried out in the farming ponds of *Penaeus vannamei*. A total of seventy (70) potential macrofauna carriers: crabs (20), krill (20) & gastropods (30), that coexist with shrimp in ponds and surrounding areas were collected & screened by polymerase chain reaction (PCR) assay to identify EHP-positive animals. The commercially available IQ2000™ EHP Detection and Prevention System (Gene Reach/ Taiwan), was used for the PCR assay. The findings revealed 92.85% of the EHP prevalence in all three species confirming them as potential carriers for EHP disease. Among them, 95% of the highest prevalence was reported in crabs and 93.33% of the second highest prevalence was reported in gastropods. In the ponds where shrimp samples tested positive for EHP, the carrier species were also found to be positive for EHP, confirming a link between the presence of specific carrier species (EHP positive) and the occurrence of diseases in the shrimp population. Variations in the water quality parameters such as DO, salinity, and total ammonia influenced the prevalence of EHP among the identified carriers. The findings suggest that macrofauna species: crabs, gastropods and krill in shrimp ponds could be potential transmission vectors for EHP disease in shrimp culture. Thus, it is crucial to develop biosecurity measures such as Utilize strict quarantine procedures for new stock & disinfection of equipment, to control these macrofauna species in the shrimp pond culture system to minimize the disease spread and mitigate the impact of EHP on the shrimp farming system.

Keywords: EHP, Carrier species, PCR, Prevalence, *Penaeus vannamei*.

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Effect of black soldier fly larvae (*Hermitia illucens*) fish feed supplemented with soya lecithin for the growth of Siamese fighting fish (*Betta splendens*)

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Abstract

The protein source is a crucial component in fish feed, providing adequate protein and essential amino acids needed for growth and maintaining biological functions. As aquaculture production increases, so does the demand for fish feeds, making the search for alternative protein sources essential to meet current and future needs. This study aimed to evaluate the effect of using black soldier fly (*Hermetia illucens*) larvae meal, supplemented with soya lecithin, as a protein source fat absorption enhancer in the diet of Siamese fighting fish (*Betta splendens*), respectively. Five dietary treatments were prepared: a control diet with fishmeal as the protein source, and black soldier fly larvae meal as the protein source combined with 0%, 2%, 4%, or 6% soya lecithin. To assess the effects of these diets, *B. splendens* were fed the different treatments, and growth performance was monitored by measuring fish weight, with nine replicates per treatment group. The weight data were analyzed using an ANOVA to identify significant differences among the groups. Results showed no statistically significant differences in the growth performance of the fish across all treatments compared to the control treatment (F-statistic = 0.19, $p = 0.905$). These findings suggest that black soldier fly larvae meal could serve as a viable alternative protein source to replace fishmeal in *Betta splendens* diets without compromising growth performance. However, further research is necessary to examine other aspects of fish health, nutrient utilization, and to optimize diet formulations for cost-effectiveness and sustainability.

Keywords: *Betta splendens*, Black soldier fly larvae meal, Growth performance.

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GIS-based modelling of habitat suitability for yellowfin tuna in waters around Sri Lanka

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Abstract

The study utilized a Geographic Information System (GIS) to model habitat suitability for yellowfin tuna (*Thunnus albacares*) in waters around Sri Lanka, a species that is economically vital and ecologically significant. The primary objective is to map areas favorable for yellowfin tuna based on environmental factors such as sea surface temperature (SST) and chlorophyll-a (CHL-a) concentration, which influence tuna distribution and abundance. Fish catch and coordinates were gathered using long-line vessels operating primarily from southern harbors, supplemented with secondary data sources, including vessel monitoring systems and remote sensing data (SST and CHL-a) from Moderate Resolution Imaging Spectroradiometer (MODIS). The study area encompasses Sri Lankan territorial waters and parts of the Arabian Sea, with a particular focus on zones within the Exclusive Economic Zone (EEZ) where yellowfin tuna is frequently observed. Data processing was conducted using ArcGIS, where spatial analyses were employed to identify SST and CHL-a ranges most conducive to yellowfin tuna presence. Results indicate that tuna are predominantly found in waters where SST ranges from 26°C to 31°C, with the highest catch frequency occurring at 28-30°C. CHL-a concentration further highlights productivity zones, with tuna aggregation most prominent in regions where CHL-a levels are between 0.3–0.4 mg/m³, suggesting areas of high phytoplankton activity favorable for tuna feeding. Hotspot mapping identified specific regions off the southwest and southeast coasts of Sri Lanka as critical habitats, where targeted fishing efforts could enhance catch efficiency while preserving less productive zones. The study highlights the need for marine protected areas (MPAs) to conserve critical habitats and support sustainable fisheries. It emphasizes adaptive fisheries management in response to potential shifts in tuna distribution due to climate change. Using GIS-based habitat modeling, the research provides valuable insights for balancing sustainable fishing with conservation, ensuring the long-term health of yellowfin tuna populations and the livelihoods of local fishing communities.

Keywords: Habitat suitability, Yellowfin tuna, GIS modelling, Sea surface temperature, Chlorophyll-a concentration