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Polysaccharides from Marine Macroalga, *Padina gymnospora* Improve the Nonspecific and Specific Immune Responses of *Cyprinus carpio* and Protect it from Different Pathogens

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Abstract

Immunostimulation by plant-derived compounds presents a fascinating alternative to vaccines and antibiotics in aquaculture. Fish farmers are longing for immunostimulants that activate both specific and nonspecific immune responses of fish and protect fishes from all possible infections. In this study, we observed that polysaccharide fraction from marine macroalga, *Padina gymnospora* stimulated the immune response of common carp *Cyprinus carpio* (Filed for patent, Indian patent no. 201641027311 dated:10-Aug-2016). Our results indicate that fish fed with polysaccharides as feed supplement improved all the immune parameters tested which include serum lysozyme, myeloperoxidase activities and antibody response. Further, polysaccharide fraction protected the fish from its common bacterial pathogens namely *Aeromonas hydrophila* and *Edwardsiella tarda* with relative percent survival (RPS) values of 80 and 60 respectively. Gene expression studies, indicate that the immunostimulation by *P. gymnospora* might be at least in part due to the upregulation of the cytokine interleukin-1 β (IL-1 β) and antimicrobial peptide lysozyme-C.

Keywords: Immunostimulant, Polysaccharide, Macroalga, *Cyprinus carpio*, Leucocytes, Cytokines

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