

Seaweed as a Potential Food Source to Enhance Sea Cucumbers (*Holothuria scabra*) Growth in Aquaculture at Illupakadavai Coastal Area in Mannar

P.F. Figurado^{1,2}, G. Nishanthan³, M.G.Y.L. Mahagamage^{1*}

¹Department of Fisheries & Aquatic Resources, Konthaipiddy, Mannar.

²Centre for Environmental Studies and Sustainable Development, The Open University of Sri Lanka, Nawala, Nugegoda, Sri Lanka.

³Department of Aquaculture & Fisheries, Faculty of Livestock Fisheries & Nutrition, Wayamba University of Sri Lanka, Sri Lanka.

*mqyma@ou.ac.lk

Sea cucumbers (Class Holothuroidea, Phylum Echinodermata) are marine invertebrates that contribute to nutrient recycling in benthic ecosystems. In Sri Lanka, *Holothuria scabra* is economically valuable, but intensive aquaculture has reduced growth rates due to depleted natural food sources. This study evaluated the growth and survival of *H. scabra* in an integrated co-culture system with seaweeds (*Kappaphycus alvarezii* and *Gracilaria salicornia*) under pen farming conditions at Illupakadavai lagoon, Mannar, over ten weeks (October 2022 – January 2023). Eight pens (25 m² each) were stocked with 30 sea cucumbers per pen. Treatments (in duplicate) were: *H. scabra* with 9 kg *K. alvarezii*; with 9 kg *G. salicornia*; with both seaweeds (4.5 kg each); and control (*H. scabra* only). Seaweeds were co-cultured to enhance sediment organic matter and detritus, providing indirect nutrition. Growth parameters and survival were measured fortnightly. Water quality (pH, salinity, electrical conductivity, total dissolved solids, turbidity) and sediment quality (pH, electrical conductivity, available phosphorus, exchangeable potassium, organic matter, texture) were analyzed at the start and end. Highest growth occurred in pens with both seaweeds (final weight: 302.68 ± 6.45 g; specific growth rate: 1.85 %) compared to controls (226.02 ± 2.57 g; 1.44 %). Survival was 100 % in all pens. Sediment organic matter was highest with *K. alvarezii* alone (1.95 ± 0.07 %) and intermediate with both seaweeds (1.20 ± 0.21 %) vs. controls (0.30–0.40 %). Although water pH (6.70–7.35) and salinity (19.57–23.36 ppt) were below optimal ranges (7.5–8.5 and 28–30 ppt), no significant correlation with growth was found ($p > 0.05$). The combined seaweed system yielded positive net profit (LKR 3,910 per pen over 10 weeks). Integrated seaweed co-culture indirectly enhances *H. scabra* growth through sediment enrichment, offering a sustainable aquaculture strategy.

Keywords: *Holothuria scabra*, Seaweed integration, Co-culture, Growth performance, Sediment organic matter