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Integrated Multi-Trophic Aquaculture could help fight against sea lice

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A potential benefit of Integrated Multi-Trophic Aquaculture (IMTA) may be that filter-feeding shellfish could act as biological agents in the control of sea lice on salmon farms.

Two papers funded by the Canadian Integrated Multi-Trophic Aquaculture Network (CIMTAN) and the Department of Fisheries and Oceans have recently been published on this particular subject.

IMTA uses the by-products, including waste, from one aquatic species as inputs for another. It combines the cultivation of fed aquaculture species (e.g. finfish/shrimp) with inorganic extractive aquaculture species (e.g. seaweed) and organic extractive aquaculture species (e.g. shellfish/herbivorous fish) to create a balanced ecosystem management approach to aquaculture.

Janis Webb, an MSc student with CIMTAN working at the Pacific Biological Station in Nanaimo, B.C., recently had her graduate research published in "Aquaculture".

She tested four species of filter feeders – basket cockles, blue/gallo mussels, Pacific oysters and Pacific scallops – for their ability to consume sea lice larvae in the laboratory.

Webb found that all four species were capable of ingesting the larvae and that neither temperature nor the presence/absence of phytoplankton had any significant effect on the proportion consumed.

Other research, conducted at the Saint Andrews Biological Station, focused on the ability of filter feeding Atlantic sea scallops and blue mussels to consume the copepodid stages of sea lice in the laboratory under both static and flowing water conditions, with variable copepodid densities and with the aid of a light attractant.

This work was published in the "Journal of Fish Diseases."

The research found that blue mussels consumed similar proportions of copepodids at low and high larval densities under both static and flowing water conditions and ingested more when a light attractant was present. Sea scallops were also found to be capable of ingesting lice copepodids.

Both studies have shown that various filter feeding shellfish have the ability to consume sea lice larvae under controlled laboratory conditions.

Field trials are currently underway at a commercial salmon farm on the west coast to determine whether commercial-scale densities of Pacific oyster can significantly affect planktonic sea lice numbers and/or the concentration of adult lice on fish.