

UNIVERSIDAD DE LA FRONTERA

Facultad de Ingeniería y Ciencias

Doctorado en Ciencias de Recursos Naturales



**ANTIBACTERIAL AND ANTIFUNGAL ACTIVITIES FROM
THE RED SEAWEED *CERAMIVM RUBRUM* (HUDSON)
(RHODOPHYTA, FLORIDEOPHYCEAE) AGAINST
YERSINIA RUCKERI AND *SAPROLEGNIA PARASITICA***

**DOCTORAL THESIS IN FULFILLMENT OF
THE REQUIREMENTS FOR THE
DEGREE DOCTOR OF SCIENCES IN
NATURAL
RESOURCES**

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TEMUCO-CHILE

2020

**“ANTIBACTERIAL AND ANTIFUNGAL ACTIVITIES FROM THE RED SEAWEED
CERAMIUM RUBRUM (HUDSON) (RHODOPHYTA, FLORIDEOPHYCEAE)
AGAINST *YERSINIA RUCKERI* AND *SAPROLEGNIA PARASITICA*”**

Esta tesis fue realizada bajo la supervisión del Director de Tesis, Dr. Andrés Eduardo Quiroz Cortez, del Departamento de Ciencias Químicas y Recursos Naturales de la Universidad de La Frontera y ha sido aprobada por los miembros de la comisión examinadora.

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Thesis summary

"Red Mouth Disease and Saprolegniasis are harmful conditions affecting salmonid aquaculture caused by *Yersinia ruckeri* bacterium and *Saprolegnia parasitica* oomycete, respectively. Managing outbreaks in fish farms often involves prevention or chemical treatments, yet limitations such as environmental concerns, toxicity, and expenses drive the search for alternatives. Marine organisms, including algae, sponges, and corals, offer a natural source of bioactive compounds with antimicrobial properties. Seaweeds, notably *Ceramium rubrum*, have shown promise due to their antimicrobial potential. This study delves into the antimicrobial properties of a lipophilic *C. rubrum* extract against *Y. ruckeri* and *S. parasitica*. Extracts were obtained through ethanol extraction and partitioning, revealing fatty acids, esters, hydrocarbons, and phytol. Antimicrobial tests indicated stronger activity in the whole extract, pointing to synergistic effects among constituents. Fractionation into sub-extracts highlighted nine potent against *Y. ruckeri*. Further analysis involving various techniques identified inhibitory metabolites. This research lays a foundation for potential future applications, suggesting *C. rubrum* as a source of antimicrobial compounds against fish pathogens in aquaculture."