Macroalgal allelopathic metabolites: Ecological consequences and their potential

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Allelopathy refers to the biochemical interaction between organisms, often primary producers and microorganisms, mediated by secondary metabolites known as allelochemicals. While well-documented in terrestrial ecosystems, allelopathy remains significantly understudied in marine environments, despite the vast diversity of marine organisms. Marine allelochemicals play crucial roles in ecological interactions such as competition and defense, influencing species distribution and abundance in shallow-water communities. Moreover, these compounds hold immense promise for bioprospecting, particularly in the development of natural products such as agrochemicals, pharmaceuticals, and other biotechnological applications. Notably, marine natural products exhibit higher success rates in drug development compared to terrestrial counterparts. Investigating allelopathic interactions in marine systems thus provides both ecological insights and opportunities for discovering novel biologically active substances.

Red seaweeds (Rhodophyta) are the macroalgal group with the most bioactive compounds and include the highest number of taxa with documented allelopathy, making them ideal test organisms for this research. Extracts from three Rhodophyte species (*Palmaria palmata*, *Gracilaria gracilis*, and *Acrochaetium secundatum*) were prepared and tested for growth inhibition against microalgae (*Phaeodactylum tricornutum* and *Tisochrysis lutea*) using a concentration series. Three types of extracts were examined: polar extracts from seaweed dry powder, nonpolar extracts from the thallus surface, and nonpolar extracts from the entire thallus. The primary objective is to identify which extracts exhibit the strongest inhibitory effects. Subsequently, these extracts will be analyzed to determine their chemical composition.

Keywords
Rhodophyta, Allelopathy, Microalgae, Marine Natural Products