

Role of secondary metabolites as defense chemicals against ice-ice disease bacteria in biofouler at carrageenophyte farms

Abstract

Carrageenophyte farming is an expanding economical activity in North Borneo Island, Malaysia. During routine monitoring of "ice-ice" disease and epiphyte outbreak at commercial farms, it was apparent that culture lines were heavily (60-80%) infested with biofoulers, particularly *Acanthophora* spp. and *Laurencia majuscula*. However, only *L. majuscula* showed dominance and flourished even during "ice-ice" disease outbreak. Presence of chemical defense against seaweed pathogens was investigated in two populations of *L. majuscula* collected from three major carrageenophyte farms in two districts; (A) Lohok Butun, Selakan Island, and Bum-Bum Island, in Semporna district, and (B) Telutih, Carrington Reef, and Balambangan Island, in Kudat district. The first population contained elatol (1), and iso-obtusol (2), and second population contained (Z)-10,15-dibromo-9-hydroxy-chamigra-1,3(15),7(14)-triene (3) and (E)-10-15-dibromo-9-hydroxy-chamigra-1,3(15),7(14)-triene (4), as their antibacterial metabolites. All four metabolites showed highly selective inhibition against "ice-ice" disease bacteria compared to human pathogens at 30 µg disk⁻¹. In addition, seasonal variation of these compounds at two representative farms (Selakan Island [P-1] and Balambangan Island [P-2]) revealed a 120-170% increase in concentration during "ice-ice" disease outbreak. Microscopy of fresh specimens showed the presence of corps en cerise, which is the synthesis and storage site of halogenated metabolites at superficial cortical cells, branch tips, and trichoblasts. This suggests the importance of these metabolites as defense chemicals against "ice-ice" disease bacteria in *L. majuscula* that grows on seaweed culture lines. © Springer Science+Business Media B.V. 2009.