

Sulfated Oligosaccharides Mediate the Interaction between a Marine Red Alga and Its Green Algal Pathogenic Endophyte

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Abstract

The endophytic green alga *Acrochaete operculata* completely colonizes the sporophytes of the red alga *Chondrus crispus*; however, it does not penetrate beyond the outer cell layers of the gametophytes. Given that the life cycle phases of *C. crispus* differ in the sulfation pattern of their extracellular matrix carrageenans, we investigated whether carrageenan fragments could modulate parasite virulence. λ -Carrageenan oligosaccharides induced release of H_2O_2 , stimulated protein synthesis, increased carrageenolytic activity, and induced specific polypeptides in the pathogen, resulting in a marked increase in pathogenicity. In contrast, κ -carrageenan oligosaccharides did not induce a marked release of H_2O_2 from *A. operculata* but hindered amino acid uptake and enhanced their recognition by the host, resulting in a reduced virulence. Moreover, *C. crispus* life cycle phases were shown to behave differently in their response to challenge with cell-free extracts of *A. operculata*. Gametophytes exhibited a large burst of H_2O_2 , whereas only low levels were released from the sporophytes.