

Ecological and evolutionary diversification of sulphated polysaccharides in diverse photosynthetic lineages: a review

ABSTRACT

Sulphated polysaccharides (SPs) are carbohydrate macromolecules with sulphate esters that are found among marine algae, seagrasses, mangroves and some terrestrial plants. The sulphate concentration in the ocean (28 mM) since ancient time could have driven the production of SPs in marine algae. SPs have a gelatinous property that can protect marine algae against desiccation and salinity stress. Agar and carrageenan are red algal SPs that are widely used as gelling agents in the food and pharmaceutical industries. The information on the SPs from freshwater and land plants are limited. In this review, we reviewed the taxonomic distribution and composition of SPs in different photosynthetic lineages, and explored the association of SP production in these diversified photosynthetic organisms with evolution history and environmental stresses. We also reviewed the genes/proteins involved in SP biosynthesis. Insights into SP biosynthetic machinery may shed light on the evolution that accompanied adaptation to life on earth.

Keyword: Algae; Cell wall; Seagrass; Sulphated polysaccharide; Photosynthetic organisms