

Glycobiology 2020: Effect of *Pseudoalteromonas* sp. MEBiC 03485 on Biomass Production and Sulfated Extracellular Polysaccharide Biosynthesis of *Porphyridium cruentum* UTEX 161- Sang-Il Han -Korea University

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Abstract:

Porphyridium cruentum is an industrially valuable red microalga (Rhodophyta) that can produce rich amounts of sulfated extracellular polysaccharides (S-EPS). However, the industrial application of the *P. cruentum* is limited, and it is mostly hindered by low yield that does not meet the demand for commercial production. Therefore, we attempted to develop a novel strategy based on microbial interactions to enhance *P. cruentum* EPS production and biomass. In this study, the effect of co-culturing *Pseudoalteromonas* sp. MEBiC 03485 with *P. cruentum* UTEX 161 were examined. *Pseudoalteromonas* sp. enhanced the growth of *P. cruentum* and the productivity and biological activities of S-EPS. The biological activities of S-EPS extracts from the *P. cruentum* culture treated with *Pseudoalteromonas* sp. were higher than the negative control. These results were due to the compounds secreted from *Pseudoalteromonas* sp., which stimulated the production of phycoerythrin and phycocyanin, thus eventually increasing the growth of *P. cruentum* as well as the productivity and the sulfur content of the S-EPS. Our results suggest a novel approach for potentially enhancing the growth of *P. cruentum* and the productivity and bioactivities of the S-EPS by co-culturing with the symbiotic bacterium *Pseudoalteromonas* sp. MEBiC

Rice straw and sugarcane bagasse were co-pyrolyzed with polypropylene and polystyrene utilizing microwaves, and the pyrolysis fumes were chemically overhauled utilizing HZSM-5 impetus. The item yields, organization and properties of bio-oil from pyrolysis of individual feedstocks and equivalent creation blends when reactant upgradation were altogether researched. The pyrolysis oil yields from polypropylene (82 wt%) and polystyrene (98 wt%) were high contrasted with that from rice straw (26 wt%) and bagasse (29 wt%). Synergist upgradation at weight hourly space speed of 11 h⁻¹ brought about higher selectivity to unsaturated aliphatics and fragrant hydrocarbons. Properties of redesigned bio-oil from biomass-polypropylene blends were like that of light fuel oil with high calorific worth (43 MJ/kg), low consistency (1 cP), ideal thickness (0.850 g/cm³) and streak point (70 °C). Oxygen content in chemically updated co-pyrolysis bio-oil was low (<5%) when contrasted with redesigned pyrolysis bio-oil (14–18%), and pyrolysis bio-oil without upgradation (20–24%).

The impact of co-development of *Porphyridium cruentum* UTEX 161 with *Pseudoalteromonas* sp. MEBiC 03485 on *P. cruentum* development and its sulfated polysaccharide (EPS) creation were analyzed. The strain MEBiC 03485 effectsly affected *P.*

cruentum development, EPS creation, and EPS quality. These impacts were because of a compound emitted by the strain MEBiC 03485. Prominently, secretory compound treatment likewise expanded intracellular phycoerythrin and phycocyanin content by 89.4% and 161%, separately. What's more, the organic exercises of EPS extricated from MEBiC 03485 treatment would in general be higher than the control without treatment. Our outcomes propose a novel methodology for possibly improving the development of *P. cruentum* and its EPS creation and quality by co-refined with the advantageous strain MEBiC 03485.

Primary Methods: A Bohlin C50 rheometer was utilized to assess the thickness and flexibility of the EPS arrangements. HSV infection, types 1 and 2, Vaccinia infection and Vesicular stomatitis infection were utilized alongside two Gram-negative (*Escherichia coli* and *Salmonella enteritidis*) and one Gram-positive (*Staphylococcus aureus*) microorganisms, for testing the antimicrobial movement of EPS.

Key- Findings: The development of microalgae was higher in NTIP medium and the creation of EPS was improved by sulfate 21mM. The protein substance of the EPS was upgraded by the expansion of sulfate 52mM and 104mM; this fixation likewise prompted an increment in sulfate substance of the EPS. In any case, neither the substance of EPS in starches and uronic acids were influenced by the way of life medium supplementation in sulfate. When all is said in done, the EPS from the Spanish strain introduced a higher antiviral action than the EPS from the Israeli strain. All EPS separates uncovered a solid action against *V. stomatitis* infection, higher than the action of every single concoction compound tried. The EPS from the Israeli strain likewise introduced antibacterial action against *S. enteritidis*.

Hugeness: Advancement of the way of life medium with sulfate improved protein and sulfate substance of EPS. EPS separates introduced a pertinent action against *V. stomatitis* infection and *S. enteritidis* bacterium.