

TOKSISITAS TEMBAGA (Cu) DAN KADMIUM (Cd) TERHADAP
PERTUMBUHAN, KADAR KLOORIFIL-*a* DAN KAROTENOID
FITOPLANKTON *Nitzschia* sp.

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INTISARI

Aktivitas industri dan manusia bertanggung jawab terhadap kerusakan lingkungan seperti pencemaran akibat penanganan limbah yang kurang baik. Pencemaran menjadi penyebab utama adanya akumulasi logam berat seperti tembaga (Cu) dan kadmium (Cd) di dalam ekosistem perairan. Adanya logam berat toksik tersebut menyebabkan gangguan biologis terhadap ekosistem dan menurunkan kualitas perairan tersebut. Ekosistem yang paling terdampak akibat pencemaran yakni laut sebagai tempat buangan akhir. Fitoplankton *Nitzschia* sp. merupakan produsen primer dalam tingkatan trofik dan termasuk dalam diatom benthik yang terdampak secara langsung oleh cemaran logam berat di permukaan dasar sedimen. Penelitian ini bertujuan untuk mempelajari toksisitas tembaga (Cu) dan kadmium (Cd) terhadap pertumbuhan, kadar klorofil-*a*, dan karotenoid fitoplankton *Nitzschia* sp. serta mempelajari nilai IC_{50-96} jam terhadap pertumbuhan dan kadar klorofil-*a*, LOEC dan NOEC. Penelitian dilakukan di Pusat Penelitian Oseanografi LIPI melalui empat tahap yakni kultivasi fitoplankton, *definitive test*, penghitungan densitas sel fitoplankton, dan uji klorofil-*a* dan karotenoid. Hasil yang diperoleh menunjukkan bahwa semakin tinggi konsentrasi logam berat, densitas sel fitoplankton dan kandungan pigmen intraseluler *Nitzschia* sp. akan semakin menurun. Berdasarkan penelitian, diperoleh nilai IC_{50-96} jam tembaga (Cu) dan kadmium (Cd) terhadap pertumbuhan adalah 0,268 mgCu/L dan 0,159 mgCd/L. Nilai IC_{50-96} jam tembaga (Cu) dan kadmium (Cd) terhadap kadar klorofil-*a* adalah 0,274 mgCu/L dan 0,150 mgCd/L. LOEC terhadap *Nitzschia* sp. yakni 0,18 mgCu/L dan 0,18 mgCd/L, sedangkan NOEC terhadap *Nitzschia* sp. sebesar 0,1 mgCu/L dan <0,18 mgCd/L. Toksisitas tembaga dan kadmium berpengaruh signifikan terhadap kadar karotenoid pada konsentrasi toksikan 0,1 mgCu/L dan 0,18 mgCd/L.

Kata kunci: kadmium, tembaga, *Nitzschia* sp., uji toksisitas, klorofil-*a*, karotenoid

COPPER (Cu) AND CADMIUM (Cd) TOXICITY ON GROWTH,
CHLOROPHYLL-*a* AND CAROTENOID CONTENT OF PHYTOPLANKTON
Nitzschia sp.

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ABSTRACT

Industrial and human activities are responsible to environmental damage such as pollution due to poor sewage treatment. Pollution is the main cause of heavy metal accumulation such as copper (Cu) and cadmium (Cd) in aquatic ecosystem. The presence of toxic heavy metals causes biological disturbance to the ecosystems and deleterious effect to the water quality. The most affected ecosystem by pollution is the marine environment as the ultimate sink of all wastes. Phytoplankton *Nitzschia* sp. is the major primary producer in trophic level and categorized as benthic diatom which is directly affected by the heavy metals pollution in the surface sediment. This research aimed to study the toxicity of copper (Cu) and cadmium (Cd) on growth, chlorophyll-*a* and carotenoid content of phytoplankton *Nitzschia* sp. and to study the IC_{50-96} h value on growth and chlorophyll-*a* content, LOEC, and NOEC. This research was done in Research Center of Oceanography, Indonesian Institute of Sciences through four steps: phytoplankton cultivation, definitive test, cell density counting, and chlorophyll-*a* and carotenoid test. Result showed that increasing heavy metals concentration lead to the decreasing of cell density and intracellular pigment content of *Nitzschia* sp. Based on the research, the IC_{50-96} h value of copper (Cu) and cadmium (Cd) on growth was 0,268 mgCu/L and 0,159 mgCd/L. The IC_{50-96} h value of copper (Cu) and cadmium (Cd) on chlorophyll-*a* content was 0,274 mgCu/L and 0,150 mgCd/L. LOEC to *Nitzschia* sp. was 0,18 mgCu/L and 0,18 mgCd/L, while NOEC to *Nitzschia* sp. was 0,1 mgCu/L and <0,18 mgCd/L. Copper and cadmium toxicity significantly affected the carotenoid content of toxicant concentration of 0,1 mgCu/L and 0,18 mgCd/L.

Keywords: cadmium, copper, *Nitzschia* sp., toxicity testing, chlorophyll-*a*, carotenoid