

ABSTRACT

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EVALUATION BIODEGRADATION OF MALACHITE GREEN USING PELITA HARAPAN UNIVERSITY BACTERIAL COLLECTION AND ANALYSIS OF METABOLITES PRODUCED

Thesis, Faculty of Science and Technology (2018).

(xiv + 78 pages; 7 tables; 24 figures; 12 appendices)

Malachite green is one of the most popular synthetic dyes, especially in aquaculture. However, malachite green is potentially carcinogenic and mutagenic. This research aimed to evaluate the biodegradation ability of bacteria collections of Pelita Harapan University on decolorizing malachite green and analyze the metabolites produced. *Enterobacter cloacae* (M8) and *Klebsiella quasipneumoniae* (GYP CV4) showed the highest decolorization percentage (more than 90 %) when incubated on 30 – 35 °C for 48 hours in nutrient broth supplemented with 0,0025 % malachite green medium. Semi purification were applied on crude enzyme by acetone precipitation. Five to six bands were produced on SDS-PAGE, and both isolates showed positive result on peroxidase test. Secondary metabolite produced was analyzed through TLC and UV-Vis spectrophotometer which showed the formation of ring-cleaved malachite green structure. The study of toxic effect of metabolites produced confirmed that the products/metabolites formed after malachite green degradation was less-toxic. Moreover, the crude enzyme of M8 and GYP CV4 exhibited the ability to degrade malachite green with considerable decolorization percentage (80,43 % & 89,45 %) after 3 hours of incubation.

Keywords: malachite green, biodegradation, metabolites, enzyme.

References: 66 (1974 - 2018).

ABSTRAK

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EVALUASI BIODEGRADASI *MALACHITE GREEN* OLEH BAKTERI KOLEKSI UNIVERSITAS PELITA HARAPAN SERTA ANALISIS METABOLIT YANG DIHASILKAN

Tugas Akhir, Fakultas Sains dan Teknologi (2018).

(xiv + 78 halaman; 7 tabel; 24 gambar; 12 lampiran)

Malachite green merupakan salah satu pewarna sintetis yang paling banyak digunakan, khususnya dalam bidang akuakultur. Akan tetapi, *malachite green* berpotensi sebagai agen karsinogenik dan mutagenik. Penelitian ini ditujukan untuk mengevaluasi kemampuan biodegradasi *malachite green* oleh bakteri koleksi UPH serta menganalisis metabolit hasil degradasi tersebut. *Enterobacter cloacae* (M8) dan *Klebsiella quasipneumoniae* (GYP CV4) menunjukkan kemampuan biodegradasi *malachite green* dengan persentase dekolorisasi tertinggi (lebih dari 90 %) ketika diinkubasi pada suhu 30 – 35 °C selama 48 jam pada medium *nutrient broth* yang mengandung *malachite green* 0,0025 %. Pada pengujian enzim, semipurifikasi enzim dibuat dengan mempresipitasi *crude enzyme* dengan aseton. Hasil presipitasi enzim menunjukkan terbentuknya lima hingga enam pita protein pada SDS-PAGE, dan kedua isolat menunjukkan hasil positif pada uji aktivitas peroksidase. Analisis metabolit yang dihasilkan dengan menggunakan metode TLC maupun spektrofotometer UV-Vis menunjukkan terbentuknya metabolit baru hasil pemecahan cincin aromatik *malachite green*. Hasil uji toksisitas metabolit menunjukkan bahwa *malachite green* yang telah terdegradasi bersifat lebih tidak toksik. Selain itu *crude enzyme* isolat M8 dan GYP CV4 mampu mendegradasi *malachite green* dengan persentase dekolorisasi yang tinggi (80,43 % & 89,45 %) dalam waktu 180 menit.

Kata kunci: *malachite green*, biodegradasi, metabolit, enzim.

Referensi: 66 (1974 - 2018).