

ABSTRAK

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UJI KEMAMPUAN DEKOLORISASI BAKTERI RESISTEN TEMBAGA *Acinetobacter* sp. STRAIN CN 5

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(xiii + 57 halaman; 17 gambar; 1 tabel; 1 lampiran)

Limbah B3 menjadi salah satu faktor pencemaran lingkungan, contohnya adalah pewarna dan logam berat tembaga. Limbah pewarna dan tembaga sangat mencemari lingkungan karena keduanya tidak dapat terurai secara alami dan akan terakumulasi di alam, sehingga limbah ini dapat masuk ke dalam rantai makanan manusia dan menyebabkan berbagai penyakit. Oleh karena itu, diperlukan solusi untuk mengatasi masalah limbah pewarna dan tembaga. Solusi yang paling murah, ramah lingkungan, dan efektif adalah bioremediasi dengan bakteri. Satu jenis bakteri dapat memiliki banyak kemampuan, sehingga potensi ini perlu dimanfaatkan untuk mengatasi masalah limbah pewarna dan tembaga secara sekaligus. Namun, belum banyak penelitian mengenai bakteri yang dapat mendekolorisasi pewarna sekaligus resisten terhadap tembaga. Bakteri *Acinetobacter* sp. strain CN5 telah diteliti memiliki kemampuan resistensi terhadap tembaga, namun kemampuan dekolorisasinya belum pernah diteliti meskipun bakteri genus ini memiliki enzim yang menunjang aktivitas dekolorisasinya. Sehingga, penelitian ini akan menguji kemampuan dekolorisasi dari bakteri *Acinetobacter* sp. strain CN5. Dari 12 pewarna uji, bakteri *Acinetobacter* sp. strain CN5 dapat tumbuh pada 11 pewarna, yaitu *methylene blue*, *congo red*, *mordant orange*, *reactive black*, *direct yellow*, *basic fuchsin*, *reactive orange*, *disperse orange*, remasol merah, wantex kuning, dan wantex merah. Aktivitas dekolorisasi terbaik dari bakteri *Acinetobacter* sp. strain CN5 ditunjukkan pada pewarna *methylene blue* (57.64 %), *congo red* (53.17 %), *basic fuchsin* (91.37 %), dan wantex merah (67.50 %). Bakteri *Acinetobacter* sp. strain CN5 juga memiliki resistensi tinggi terhadap keempat pewarna tersebut, yaitu 500 ppm pada *methylene blue*, *basic fuchsin*, dan wantex merah, dan 450 ppm pada *congo red*. Pertumbuhan dan dekolorisasi bakteri *Acinetobacter* sp. strain CN5 menghasilkan hasil yang baik ketika ditambahkan 3 mM Cu, yang menunjukkan bakteri dapat menjalankan aktivitas dekolorisasi pewarna dan resistensi tembaga secara sekaligus. Penelitian ini menunjukkan bahwa bakteri *Acinetobacter* sp. strain CN5 dapat bekerja sebagai bakteri bioremediasi pewarna dan tembaga yang baik dengan potensi yang masih terbuka untuk penelitian selanjutnya terhadap bakteri ini.

Kata kunci: dekolorisasi, resistensi, pewarna, tembaga, *Acinetobacter*

Referensi: 91 jurnal + 5 buku + 3 website (1988 – 2020)

ABSTRACT

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DECOLORIZATION BY *Acinetobacter* sp. STRAIN CN5 AS COPPER-RESISTANT BACTERIA

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(xiii + 57 pages; 17 figures; 1 table; 1 appendice)

Toxic waste has been a long-time problem that causes environmental pollution. Dye waste and copper are two of the examples that are frequently found polluting the environment. These two types of waste are toxic and dangerous because of their characteristics which make them difficult to be degraded naturally and eventually will enter human's food chain that can cause some diseases. Therefore, solution is needed to solve this problem and one of the options is bioremediation with bacteria as media. Bioremediation is an environment-friendly, cost-effective and work-effective solution to toxic waste problem like dyes and copper which makes use on bacteria's fast life cycle and its ability to adapt in stressed environment. One type of bacteria can have many abilities that needs to be utilized to overcome dye and copper waste simultaneously. However, there has not been much research on bacteria that are both able to decolorize dyes and is copper resistant. *Acinetobacter* sp. strain CN5 is a copper-resistant bacteria. Despite of having enzymes (lignin peroxidase, laccase, riboflavin reductase and DCIP reductase) that actually work on decolorization, its ability to decolorize dyes has yet been researched. On this research, decolorization by copper-resistant *Acinetobacter* sp. strain CN5 will be analyzed. Out of 12 dyes, *Acinetobacter* sp. strain CN5 are able to grow in 11 dyes, which are methylene blue, congo red, mordant orange, reactive black, direct yellow, basic fuchsin, reactive orange, disperse orange, remazol red, yellow wantex, and red wantex. Its best decolorization rate are shown in methylene blue (57.64 %), congo red (53.17 %), basic fuchsin (91.37 %), dan red wantex (67.50 %). In these four dyes, *Acinetobacter* sp. strain CN5 also shows high resistance concentration, 500 ppm for methylene blue, basic fuchsin, and red wantex, and 450 ppm for congo red. When grown in medium with both dyes and copper, *Acinetobacter* sp. strain CN5 shows a great growth with some decolorization detected, which prove its ability to decolorize also is resistant of copper in the same time. This research shows *Acinetobacter* sp. strain CN5 potential as a media of bioremediation.

Keywords: decolorization, resistant, dye, copper, *Acinetobacter*

References: 91 journals + 5 books + 3 websites (1988 – 2020)