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Karakterisasi Bakteri Indigenous dari Saluran Irigasi Terpapar Limbah Cair Penyamakan Kulit dan Potensi Bioremediasi Kromium (Cr)
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

KARAKTERISASI BAKTERI *INDIGENOUS* DARI SALURAN IRIGASI TERPAPAR LIMBAH CAIR PENYAMAKAN KULIT DAN POTENSI BIOREMEDIASI KROMIUM (Cr)

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INTISARI

Industri penyamakan kulit menghasilkan limbah cair yang mengandung logam berat kromium (Cr) dan berpotensi mencemari lingkungan perairan serta membahayakan kesehatan organisme hidup. Bioremediasi menggunakan bakteri *indigenous* menjadi salah satu alternatif pengolahan limbah yang ramah lingkungan karena bakteri telah beradaptasi terhadap kondisi tercemar dan memiliki mekanisme toleransi terhadap logam berat. Penelitian ini bertujuan untuk mengidentifikasi bakteri *indigenous* resisten kromium dari limbah cair penyamakan kulit serta menganalisis efisiensi reduksi kromiumnya. Sampel limbah diambil dari badan sungai di sekitar kawasan industri penyamakan kulit. Isolasi bakteri dilakukan melalui proses *enrichment* menggunakan media yang mengandung $K_2Cr_2O_7$ 8ppm. Karakterisasi dilakukan secara fenotipik melalui pengamatan morfologi koloni, morfologi sel, dan serangkaian uji biokimia mengacu pada *Bergey's Manual of Determinative Bacteriology 9th Edition*. Empat isolat terpilih berhasil diidentifikasi, yaitu *Micrococcus* sp. GOR1, *Staphylococcus* sp. GOR2, *Aeromonas* sp. GOR3, dan *Staphylococcus* sp. GOR4. Hasil uji toleransi maksimum menunjukkan bahwa isolat *Staphylococcus* sp. GOR2 dan GOR3 mampu tumbuh hingga konsentrasi kromium 500ppm, *Micrococcus* sp. GOR1 hingga 400ppm, dan *Staphylococcus* sp. GOR4 hingga 200ppm. Pengukuran efisiensi reduksi kromium menggunakan AAS setelah inkubasi 48 jam pada konsentrasi 100ppm yang menunjukkan GOR2 memiliki efisiensi tertinggi sebesar 75,394%, diikuti GOR3 sebesar 70,542%, GOR1 sebesar 69,164%, dan GOR4 sebesar 65,230%. Seluruh isolat menunjukkan potensi sebagai agen bioremediasi limbah cair penyamakan kulit tercemar kromium.

KATA KUNCI: bakteri *indigenous*, bioremediasi, kromium, limbah penyamakan kulit, resistensi logam berat

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CHARACTERIZATION OF INDIGENOUS BACTERIA FROM IRRIGATION CHANNELS EXPOSED TO LEATHER TANNING WASTEWATER AND THE POTENTIAL FOR CHROMIUM (Cr) BIOREMEDIATION

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ABSTRACT

The leather tanning industry produces wastewater containing the heavy metal chromium (Cr), which has the potential to pollute aquatic environments and endanger the health of living organisms. Bioremediation using *indigenous* bacteria is an environmentally friendly alternative for wastewater treatment because these bacteria have adapted to contaminated conditions and possess mechanisms for tolerating heavy metals. This study aims to identify chromium-resistant *indigenous* bacteria from leather tanning wastewater and analyze their chromium reduction efficiency. Wastewater samples were collected from rivers near leather tanning industrial areas. Bacterial isolation was performed through an enrichment process using a medium containing 8ppm $K_2Cr_2O_7$. Characterization was performed phenotypically through observation of colony morphology, cell morphology, and a series of biochemical tests based on Bergey's Manual of Determinative Bacteriology, 9th edition. Four selected isolates were successfully identified, *Micrococcus* sp. GOR1, *Staphylococcus* sp. GOR2, *Aeromonas* sp. GOR3, and *Staphylococcus* sp. GOR4. Maximum tolerance test results showed that isolates *Staphylococcus* sp. GOR2 and *Aeromonas* sp. GOR3 were able to grow up to a chromium concentration of 500ppm, *Micrococcus* sp. GOR1 up to 400ppm, and *Staphylococcus* sp. GOR4 up to 200ppm. Chromium reduction efficiency measurements using AAS after 48 hours incubation at a concentration of 100ppm showed that GOR2 had the highest efficiency at 75.394%, followed by GOR3 at 70.542%, GOR1 at 69.164%, and GOR4 at 65.230%. All isolates demonstrated potential as bioremediation agents for chromium-contaminated leather tanning wastewater.

KEY WORDS: bioremediation, chromium, heavy metal resistance, *indigenous* bacteria, leather tanning waste