

**STUDI POTENSI BAKTERI UNTUK *BIOLEACHING*:
ISOLASI DAN KARAKTERISASI BAKTERI PENGHASIL ASAM
SULFAT DARI KAWASAN KAWAH SIKIDANG, DATARAN TINGGI
DIENG, JAWA TENGAH**

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INTISARI

Bakteri penghasil asam sulfat yang berpotensi untuk dimanfaatkan dalam proses *bioleaching* memungkinkan untuk diisolasi dari kawasan Kawah Sikidang, Dataran Tinggi Dieng, Jawa Tengah. Analisis geokimia menunjukkan mata air yang terdapat di kawah ini termasuk ke dalam mata air sulfat dengan kadar SO_4^{2-} 862 mg/kg dan pH 3,88. Penelitian ini bertujuan memperoleh dan mengidentifikasi isolat bakteri penghasil asam sulfat dari komposit air, tanah, dan lumpur dari kawasan kawah Sikidang. Isolasi bakteri dari sampel komposit dilakukan di medium tiosulfat dan tiosulfat dengan glukosa. Isolasi DNA genom bakteri menggunakan metode manual. *Genomic fingerprinting* menggunakan metode PCR repetitif. Pengukuran konsentrasi sulfat dilakukan dengan metode turbidimetri. Hasil *sequencing* kemudian dianalisis dengan perangkat lunak DNA Baser dan MEGA 7.0 untuk membuat pohon filogenik. Berdasarkan hasil isolasi, telah diperoleh 40 isolat bakteri untuk dianalisis dengan PCR repetitif. Berdasarkan pola pita DNA dan percabangan pada dendrogram hasil analisis PCR repetitif dipilih 16 isolat. Pengujian kemampuan penghasilan sulfat dilakukan terhadap 16 isolat bakteri. Hasil uji menunjukkan isolat TG4, T2, T24, dan TG19 menghasilkan sulfat paling banyak di antara 16 isolat bakteri, masing-masing sebesar 21,022 mg/mL; 16,008mg/mL; 9,725mg/mL; dan 8,268mg/mL. Keempat isolat kemudian diamplifikasi pada sekuen gen 16S rDNA dan dibaca urutannya. Melalui analisis BLASTN, keempat isolat tersebut memiliki persentase kemiripan dengan *Acidithiobacillus caldus* strain KU sebesar 95%. Bakteri penghasil asam sulfat yang diisolasi dari kawasan Kawah Sikidang, Dataran Tinggi Dieng, Jawa Tengah diduga sebagai anggota genus *Acidithiobacillus* dan berpotensi untuk dimanfaatkan dalam proses *bioleaching*.

Kata kunci: Kawah Sikidang, Dieng, bakteri penghasil asam sulfat, *genomic fingerprinting*, identifikasi bakteri

**POTENTIAL STUDIES FOR BIOLEACHING:
ISOLATION AND CHARACTERIZATION OF SULFURIC ACID
PRODUCING BACTERIA FROM SIKIDANG CRATER AREA,
DIENG PLATEAU, CENTRAL JAVA**

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ABSTRACT

Sulfuric acid-producing bacteria, which are potential to be applied in bioleaching process, are possible to be isolated from Sikidang Crater Area, Dieng Plateau, Central Java. Geochemical analysis shows that the springs in this crater are classified into sulfate springs with up to 862 mg/kg of SO_4^{2-} and pH 3,88. The purpose of this study were to obtain and identify sulfuric acid-producing bacteria isolated from the composites of water, soil, and mud from the region of Sikidang Crater. Bacterial isolation from composite samples was performed in the thiosulfate medium and thiosulfate medium added with glucose. Isolation of bacterial genomic DNA was done by using manual method. Genomic fingerprinting was accomplished by applying repetitive PCR method. Then, the sulfate concentration was measured by using turbidimetry method. Molecular characterization was carried out by determining the sequence of 16S rRNA gene. The sequencing results were analyzed with DNA Baser and MEGA 7.0 software to create a phylogenic tree. There were 40 bacterial isolates acquired and studied bu using repetitive PCR. Subsequently, there were 16 isolates selected based on DNA the pattern of DNA band and branching on the dendrogram and subjected to sulfuric acid analysis.. The results showed that TG4, T2, T24, and TG19 isolates produced the highest amount of sulfate, as much as 21,022; 16,008; 9,725; and 8,268 mg/ml respectively. Through the BLASTN analysis, these isolates have a 95% similarity with *Acidithiobacillus caldus* strain KU. It can be concluded that the sulfuric acid-producing bacteria isolated from Sikidang Crater area is thought to be a member of the genus *Acidithiobacillus* and have the prospect of being used in the bioleaching process.

Keywords: Sikidang crater, Dieng Plateau, thiosulfate oxidizing bacteria, genomic fingerprinting, bacterial identification