RINGKASAN

Indonesia dikenal sebagai negara yang memiliki kekayaan tambang besar, salah satunya emas. Pertambangan emas rakyat banyak ditemui terutama di DAS Batanghari, Jambi. Kurangnya kesadaran masyarakat mengakibatkan minimnya kontrol atas penggunaan logam berat merkuri dalam pertambangan. Merkuri digunakan dalam ekstraksi emas pada sistem amalgamasi dan dibuang langsung ke sungai dan lingkungan sekitar. Merkuri dalam bentuk organik metil merkuri (CH_3Hg) sangat beracun menyebabkan pencemaran lingkungan dan berdampak bagi kehidupan manusia. Reduksi dapat dilakukan dengan bioremediasi menggunakan mikroba (bakteri, fungi, dan alga) yang dinilai lebih ekonomis. Fungi *indigenous* dipilih karena dinilai lebih efektif dibandingkan mikroorganisme lainnya karena mampu beradaptasi terhadap lingkungan ekstrim dengan konsentrasi logam berat tinggi. Penelitian dilakukan bertujuan untuk mengidentifikasi isolat fungi *indigenous* DAS Batanghari, Jambi yang berpotensi mereduksi Hg limbah pertambangan emas rakyat dan mengetahui isolat fungi *indigenous* DAS Batanghari, Jambi terbaik yang mampu mereduksi merkuri Hg limbah pertambangan emas rakyat.

Penelitian ini dilakukan menggunakan kombinasi metode survei dan eksperimental dengan susunan percobaan Rancangan Acak Lengkap (RAL). Variabel bebas pada penelitian ini adalah isolat fungi hasil isolasi dan variabel terikat meliputi kemampuan isolat fungi hasil isolasi dalam mereduksi Hg. Parameter yang diamati antara lain parameter utama yaitu diameter koloni fungi, nilai tingkat hambatan relatif (THR), bobot kering miselium, dan persentase reduksi Hg, sedangkan parameter pendukung berupa pH dan persentase susut pengeringan miselium. Data kualitatif dianalisis secara deskriptif dan data kuantitatif dianalisis menggunakan *Analysis of Varians* (ANOVA) dengan tingkat kepercayaan sebesar 95% dan uji lanjut dengan menggunakan *Duncan Multiple Range Test* (DMRT) taraf 5% untuk menentukan isolat yang paling optimum. Penelitian dilaksanakan di Laboratorium Mikologi dan Fitopatologi Fakultas Biologi Universitas Jenderal Soedirman.

Hasil penelitian menunjukkan bahwa dari 40 isolat fungi *indigenous* DAS Batanghari, Jambi hasil isolasi diperoleh 8 isolat berpotensi mereduksi Hg pertambang emas rakyat yakni isolat yang diidentifikasi berasal dari genus *Aspergillus* (isolat AH9, AH24, AH33, dan C3), *Penicillium* (isolat AH23), *Trichoderma* (isolat AH18 dan AH20), dan *Fusarium* (isolat A32). Persentase reduksi Hg terbesar hingga terkecil berturut-turut yakni isolat AH9 dengan persentase sebesar 82,66%, isolat AH23 sebesar 80,92%, AH24 sebesar 79,79%, AH 18 sebesar 73,67%, AH33 sebesar 66,28%, AH20 sebesar 63,28%, C3 sebesar 61,67%, dan AH32 sebesar 59,61%. Isolat terbaik yang mampu mereduksi Hg adalah isolat AH9 dari genus *Aspergillus* dengan diameter koloni sebesar 7,85 cm, nilai tingkat hambatan relatif sebesar 8,72%, bobot kering miselium sebesar 1,47 g, dan persentase reduksi Hg sebesar 82,66%.

Kata kunci: *bioremediasi*, *fungi indegenous*, *merkuri*, *pertambangan emas*, *reduksi*

SUMMARY

Indonesia is known as a country with large wealth of mining materials, one of which is gold. Artisanal gold mining is common, especially in the Batanghari watershed, Jambi. Lack of public awareness results in minimal control over the use of heavy metal mercury in mining. Mercury is used in gold extraction in amalgamation systems and discharged directly into the river and surrounding environment. Mercury in its organic form methyl mercury (CH_3Hg) is highly toxic causing environmental pollution and impacting human life. Reduction can be done by bioremediation using microbes (bacteria, fungi, and algae) which are considered more economical. *Indigenous* fungi were chosen because they are considered more effective than other microorganisms because they are able to adapt to extreme environments with high heavy metal concentrations. The research conducted to identify *indigenous* fungi isolates from the Batanghari Watershed, Jambi that have the potential to reduce Hg from gold mining waste and to determine the best *indigenous* fungi isolates from the Batanghari Watershed, Jambi that are able to reduce Hg from gold mining waste.

This research was conducted using a combination of survey and experimental methods with a Completely Randomized Design (CRD). The independent variable in this study is the fungal isolates obtained from isolation, while the dependent variable includes the ability of the isolated fungal strains to reduce Hg. The observed parameters consist of the main parameters, namely the diameter of the fungal colonies, the relative inhibition value (THR), the dry weight of the mycelium, and the percentage of Hg reduction, while the supporting parameters include pH and the percentage of mycelium drying shrinkage. Qualitative data were analyzed descriptively and quantitative data were analyzed using *Analysis of Variance* (ANOVA) with a confidence level of 95% and further tests using *Duncan Multiple Range Test* (DMRT) at the 5% level to determine the most optimal isolate. The research was conducted at the Mycology and Phytopathology Laboratory, Faculty of Biology, Jenderal Soedirman University.

The research results show that of 40 isolates *indigenous* fungi to the Batanghari watershed in Jambi, 8 isolates have potential to reduce Hg from artisanal gold mining. These isolates identified from the genus *Aspergillus* (isolates AH9, AH24, AH33, and C3), *Penicillium* (isolate AH23), *Trichoderma* (isolates AH18 and AH20), and *Fusarium* (isolate A32). The largest to smallest percentage of Hg reduction is isolate AH9 with a percentage of 82,66%, isolate AH23 with a percentage of 80,92%, AH24 with a percentage of 79,79%, AH18 with a percentage of 73,67%, AH33 with a percentage of 66,28%, AH20 with a percentage of 63,28%, C3 with a percentage of 61,67%, and AH32 with a percentage of 59,61%. The best isolate capable of reducing Hg is isolate AH9 from the genus *Aspergillus* with colony diameter of 7,85 cm, the relative inhibition value of 8,72%, dry mycelium weight of 1,47 g, and Hg reduction percentage of 82,66%.

Keywords: *bioremediation, gold mining, indigenous fungi, mercury, reduction*