

INTISARI

FARADILA MEI JAYANI. Akselerasi Fitoremediasi Lahan Pengolahan Tambang Emas dengan Fungi Mikoriza Arbuskula. Dibimbing oleh ENY FARIDAH, HANDOJO HADI NURJANTO, dan MELYA RINIARTI

Kegiatan penambangan emas mengakibatkan akumulasi logam berat Hg yang berasal dari pengolahan bijih emas dan pembuangan *tailing* serta limbah di sekitar area penambangan. Salah satu pencemaran lingkungan yang diakibatkan dari kegiatan penambangan dan pengolahan tambang emas terjadi di Desa Bunut, Kecamatan Way Ratai, Kabupaten Pesawaran, Provinsi Lampung. Tingginya kandungan Hg dalam *tailing* dari pengolahan tambang emas memerlukan adanya upaya untuk mengurangi atau mengatasi efek kontaminan melalui remediasi. Fitoremediasi merupakan salah satu teknik remediasi menggunakan tanaman. Fitoremediasi dapat berjalan lebih efektif dengan adanya dukungan oleh Fungi Mikoriza Arbuskula (FMA). Penelitian ini bertujuan menganalisis potensi Fungi Mikoriza Arbuskula (FMA) untuk mendukung fitoremediasi di lahan pengolahan tambang emas.

Penelitian terdiri atas tiga sub-penelitian. Titik pengambilan sampel tanah dan akar di lahan pengolahan tambang emas dalam sub-penelitian 1 berdasarkan rentang jarak (0–10 m; 10–20 m) dan jenis vegetasi (kakao; mangga; dan nangka). Rancangan percobaan yang digunakan dalam sub-penelitian 2 yaitu Rancangan Petak Terbagi (*Split-Plot Design*). Petak utama yaitu inokulum FMA (tanpa inokulum FMA; *Acaulospora* sp.1; *Acaulospora* sp.2; *Acaulospora* sp.3; *Acaulospora* sp.4; *Acaulospora* sp.5). Anak petak yaitu kadar Hg (0,02 mg/kg; 21,32 mg/kg; 42,61 mg/kg). Rancangan percobaan yang digunakan dalam sub-penelitian 3 yaitu Rancangan Acak Lengkap (RAL) faktorial dengan faktor perlakuan yaitu inokulum FMA (tanpa inokulum FMA; inokulum FMA) dan kadar Hg (0,02 mg/kg; 33,14 mg/kg; 66,25 mg/kg).

Hasil penelitian menunjukkan bahwa FMA dengan jenis *Acaulospora* sp. 1, *Acaulospora* sp. 2, *Acaulospora* sp. 3, *Acaulospora* sp. 4, dan *Acaulospora* sp. 5 ditemukan pada perakaran tanaman di lahan pengolahan tambang emas Desa Bunut, Kecamatan Way Ratai, Kabupaten Pesawaran, Provinsi Lampung. Inokulasi kelima jenis FMA terseleksi mampu meningkatkan pertumbuhan bibit trembesi dan mahoni pada media yang tercemar logam berat Hg. Jenis FMA *Acaulospora* sp. 4 meningkatkan pertumbuhan dan penyerapan Hg pada daun trembesi dan mahoni lebih baik dibandingkan jenis FMA lain. FMA memiliki kemampuan untuk mempercepat proses fitoremediasi. Adanya FMA mampu meningkatkan serapan logam berat Hg pada tanaman trembesi dan mahoni. Tanaman trembesi dan mahoni memiliki mekanisme fitostabilisasi untuk meremediasi logam berat Hg.

Kata kunci: *Acaulospora* sp., endomikoriza, mahoni, merkuri (Hg), trembesi

ABSTRACT

FARADILA MEI JAYANI. Accelerated Phytoremediation of Gold Mine Processing Land with Arbuscular Mycorrhizal Fungi. Supervised by ENY FARIDAH, HANDOJO HADI NURJANTO, dan MELYA RINIARTI

Gold mining activities result in the accumulation of heavy metal, Hg, from gold ore processing and tailings and waste disposal around the mining area. One of the environmental pollution caused by gold mining and processing activities occurred in Bunut Village, Way Ratai District, Pesawaran Regency, Lampung Province. The high content of Hg in tailings from gold mine processing requires an effort to reduce or overcome the effects of contaminants through remediation. Phytoremediation is one of the remediation techniques using plants. Which could run more effectively with the support of Arbuscular Mycorrhizal Fungi (AMF). This study aims to analyze the potential of Arbuscular Mycorrhizal Fungi (AMF) to support phytoremediation in gold mine processing land.

The study consisted of three sub-studies. Soil and root sampling points at the gold mine processing site in sub-study 1 were based on a range of distance range (0 – 10 m; 10 – 20 m) and the type of vegetation (cacao; mango; jackfruit). The experimental design used in sub-study 2 was a split-plot design. The main plots were AMF inoculum (without AMF inoculum; *Acaulospora* sp.1; *Acaulospora* sp.2; *Acaulospora* sp.3; *Acaulospora* sp.4; *Acaulospora* sp.5). The subplots were Hg levels (0,02 mg/kg; 21,32 mg/kg; 42,61 mg/kg). The experimental design used in sub-study 3 is Completely Randomized Design (CRD) Factorial with treatment factors, namely AMF inoculum (without AMF inoculum; AMF inoculum) and Hg levels (0,02 mg/kg; 33,14 mg/kg; 66,25 mg/kg).

The results showed that AMF with the types of *Acaulospora* sp. 1, *Acaulospora* sp. 2, *Acaulospora* sp. 3, *Acaulospora* sp. 4, and *Acaulospora* sp. 5 were found in plant roots in the gold mine processing land of Bunut Village, Way Ratai District, Pesawaran Regency, Lampung Province. Inoculation of the five selected AMF species was able to increase the growth of rain tree and mahogany seedlings on media contaminated with heavy metal Hg. AMF species *Acaulospora* sp. 4 increased the growth and absorption of Hg in the leaves of rain tree and mahogany better than other FMA species. AMF has the ability to accelerate the phytoremediation process. The presence of AMF can increase the uptake of heavy metal Hg in rain tree and mahogany plants. Rain tree and mahogany plants have a phytostabilization mechanism to remediate heavy metal Hg.

Keywords: *Acaulospora* sp., endomycorrhiza, mahogany, mercury (Hg), rain tree