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RESEARCH PAPER

Phytoremediation of bauxite wastewater potentiality by *Jatropa curcas*

Risky Ayu Kristanti[1] · Priyatharishini Mardarveran[2] · Khalid S. Almaary[3] · Mohamed S. Elshikh[3] · Mohamed Ragab AbdelGawwad[4] · Daniel Kuok Ho Tang[5]

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Abstract

Bauxite wastewater creates soil contamination and produces toxic effects on human health such as respiratory and skin rash problems. In this study, we investigated the phytoremediation ability of *Jatropha curcas* to remove bauxite wastewater from soil. Pot experiments were conducted to investigate the bauxite wastewater on the phytoremediation potential of *J. curcas* grown in contaminated soils. *J. curcas* exhibited a significant increase in plant growth leaf, root activity, plant height, and plant shoot when grown in bauxite contaminated soils compared with *J. curcas* grown in uncontaminated soils after 30 d treatment. Under bauxite exposure, a higher aluminium removal (88.5%) was observed in soils planted with *J. curcas* than unplanted soils (39.6%). The bioconcentration factor was also found to be 5.62, indicating that *J. curcas* have great tolerance and hyperaccumulator of aluminium under high aluminium concentrations and are capable of phytoextraction of soil contaminated with bauxite wastewater.

Keywords Plant accumulator · High tolerance plant · Bauxite wastewater · *Jatropha curcas* · Polluted soil

Introduction

Water is essential for practically all living things on the planet. Water is required for the survival of most living things, including humans. When water becomes contaminated, it has devastating effects on living things [1–3]. As a result of the rapid development of industry and agricultural activities, huge quantities of heavy metals, persistent organic pollutants, pesticides, synthetic dyes, and microplastics have been created [4–9]. The mining industry is a prominent sector that contributes significantly to global socioeconomic and technological progress [10]. This industry supplies raw materials and energy to a diverse range of sectors. This sector contributes through gross domestic product (GDP), export revenue, government revenue, and corporation tax revenue. Simultaneously, the mining industry is partially responsible for technological transfer, corporate social responsibility programmes, and job creation [11, 12]. The mining and metals industry's social expectations are rapidly evolving and growing more demanding. The mining business is also referred to as a "footprint industry", as it leaves large environmental, economic, and social footprints everywhere it operates [13].

Bauxite mining is one of the most profitable metals with a large production capacity to meet the needs of local and international industries [14]. The Malaysian Chamber of Mines estimates that bauxite production was 3.26 million metric tons in 2014, up from 208,770 metric tons in 2013 and 121,873 metric tons in 2012. The entire output is exported to other Asian nations. Nonetheless, it was anticipated that demand for Malaysian bauxite would continue to grow in foreign markets [15]. Bauxite ores are composed

✉ Risky Ayu Kristanti
risky.ayu.kristanti@brin.go.id

1 Research Center for Oceanography, National Research and Innovation Agency, Jakarta 14430, Indonesia

2 Faculty of Engineering Technology, Universiti Malaysia Pahang, 26300 Gambang, Pahang, Malaysia

3 Department of Botany and Microbiology, College of Science, King Saud University, P.O. 2455, Riyadh 11451, Saudi Arabia

4 Genetics and Bioengineering, Faculty of Engineering and Natural Sciences, International University of Sarajevo, 71210 Sarajevo, Bosnia and Herzegovina

5 Environmental Science Program, Division of Science and Technology, BNU-HKBU UIC, 2000 Jintong Road, Tangjiawan, Zhuhai 519087, GD, China