

Accumulation and Translocation of Heavy Metals by *Acalypha wilkesiana* Parts in the Phytoextraction of Contaminated Soil

Naseer Inuwa Durumin Iya^{1,2,*}, Zaini Bin Assim¹, Isa Bin Ipor¹,
Ajoke Omonrinoye Omolayo^{1,3}, Isaac John Umaru^{1,4}, and Bintu Hadi Jume⁵

¹Faculty of Resource Science and Technology, Universiti Malaysia, 94300 Kota Samarahan, Sarawak, Malaysia

²Department of Chemistry, Federal University Dutse, Jigawa State, Nigeria

³Department of Geology and Mineral Sciences, Faculty of Physical Sciences, University of Ilorin, Nigeria

⁴Department of Biochemistry, Federal University Wukari, Taraba State, Nigeria

⁵Department of Chemistry, Preparatory School, Al-Jouf University, Al-jouf Region, Kingdom of Saudi Arabia

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ABSTRACT

This study was to investigate survival, growth and accumulation potential of *Acalypha wilkesiana* in phytoextraction of heavy metals contaminated soil. *Acalypha wilkesiana* was tested to evaluate its tolerance and phytoextraction capacity in soils contaminated with metals. It was tested under 10 mL of 100 mg/kg of As, Cr, Cd, Co, Cu, Fe, Mn, Ni, Pb, and Zn solution, along 240 days in greenhouse experiment with harvesting period of 60 days interval. Twenty four cuttings from *Acalypha wilkesiana* were subjected to the same treatment. Plants roots stem and leaves were dry-digested and analyzed using Atomic Absorption Spectrophotometer (AAS). Results show that Fe was the most accumulated metal followed by Cu, Mn, As and Zn with 5002.4, 542.7, 492.2, 396.7 and 308.2 mg/kg, respectively. The concentration of Cr, Ni, and Co was 101.2, 99.09, and 89.63mg/kg respectively. The highest concentration of Pb was 46.44 mg/kg, Cd was not detected by the plant. Bioconcentration Factor (BCF) of metals were above unity in root, stem, and leaf except for Fe which showed a value below the unity, and Pb shows highest BF value of 7.79. The Translocation Factor (TF) of Cr, Co, Fe, Ni, and Pb were higher, while that of As, Cu, Mn, and Zn were below the unity, Co showed the highest value of 15.93. Furthermore, Extraction Coefficient (EC) of Cr, Co, Ni, and Pb were greater than 1, while for remaining metals were lower than unity, the highest EC was observed from Pb with a value 17.21.

Keywords: *Acalypha wilkesiana*; heavy metals; bioconcentration factor; translocation factor; extraction coefficient

ABSTRAK

Penelitian ini bertujuan untuk menyelidiki kelangsungan hidup, pertumbuhan dan potensi akumulasi *Acalypha wilkesiana* dalam fitoekstraksi tanah terkontaminasi logam berat. *Acalypha wilkesiana* diuji untuk mengevaluasi toleransi dan kapasitas fitoekstraksi pada tanah yang terkontaminasi dengan logam. Pengujian menggunakan 10 mL 100 mg/kg larutan As, Cr, Cd, Co, Cu, Fe, Mn, Ni, Pb, dan Zn, selama 240 hari dalam percobaan rumah kaca dengan periode panen dalam rentang 60 hari. Dua puluh empat stek dari *Acalypha wilkesiana* memperoleh perlakuan yang sama. Batang akar tanaman dan daun dikeringkan dan dianalisis menggunakan Spektrofotometer Serapan Atom (AAS). Hasil menunjukkan bahwa Fe adalah logam yang paling terakumulasi diikuti oleh Cu, Mn, As dan Zn dengan kadar masing-masing 5002,4; 542,7; 492,2; 396,7 dan 308,2 mg/kg. Konsentrasi Cr, Ni, dan Co masing-masing adalah 101,2; 99,09 dan 89,63 mg/kg. Konsentrasi Pb tertinggi adalah 46,44 mg/kg, Cd tidak terdeteksi oleh tanaman. Faktor Biokonsentrasi (BCF) dari logam berada di atas satu dalam akar, batang, dan daun kecuali untuk Fe yang menunjukkan nilai di bawah satu, dan Pb menunjukkan nilai BF tertinggi 7,79. Faktor Translokasi (TF) Cr, Co, Fe, Ni, dan Pb lebih tinggi, sedangkan As, Cu, Mn, dan Zn berada di bawah satu, Co menunjukkan nilai tertinggi 15,93. Selanjutnya, Koefisien Ekstraksi (EC) dari Cr, Co, Ni, dan Pb lebih besar dari satu, sedangkan untuk logam yang tersisa lebih rendah dari satu, EC tertinggi diamati untuk Pb dengan nilai 17,21.

Kata Kunci: *Acalypha wilkesiana*; logam berat; faktor biokonsentrasi; faktor translokasi; koefisien ekstraksi

* Corresponding author. Tel : +60146477146
Email address : nasduruminiya@yahoo.com