KAJIAN PARAMETER FISIKA-KIMIA TANAH SEKITAR INDUSTRI TEKSTIL DI BANTUL DAN UJI TOKSISITAS MENGGUNAKAN BIJI BAYAM HIJAU (*Amaranthus viridis)* DAN KACANG HIJAU (*Vigna radiata)*

Siti Alysha Astari

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INTISARI

Kajian parameter fisika-kimia tanah sekitar industri tekstil di Bantul dan uji toksisitas terhadap pertumbuhan bayam hijau *(Amaranthus viridis)* dan kacang hijau *(Vigna radiata)* telah dilakukan. Tujuan dari penelitian ini untuk mengkaji sifat fisika-kimia dan kandungan logam berat, mempelajari adsorpsi dan desorpsi logam seng dan mengkaji toksisitas logam seng dalam tanah sekitar industri tekstil terhadap pertumbuhan bayam hijau dan kacang hijau.

Sampel tanah dibagi menjadi tiga kelompok berdasarkan tempat pengambilannya, yaitu titik sampel I, II, dan III. Sifat fisika-kimia yang dipelajari meliputi kadar air, pH (keasaman) tanah, konduktivitas listrik, kadar abu, karbon organik total, kapasitas tukar kation, kandungan logam berat dalam tanah serta karakterisasi sampel tanah menggunakan Spektroskopi Inframerah Transformasi Fourier (FTIR). Kapasitas adsorpsi diketahui dari proses adsorpsi Zn oleh sampel tanah pada berbagai konsentrasi larutan Zn. Kinetika desorpsi logam Zn dalam sampel tanah dipelajari dengan mendesorpsi Zn menggunakan larutan asam sitrat dengan berbagai konsentrasi. Konsentrasi logam diukur menggunakan instrumen Spektrofotometer Serapan Atom (SSA). Uji toksisitas dilakukan terhadap pertumbuhan bayam hijau dan kacang hijau.

Hasil penelitian menunjukkan bahwa sampel tanah titik I memiliki kadar logam Zn tertinggi dengan nilai 532,03 ± 16,79 mg kg^{-1}. Adsorpsi logam Zn oleh seluruh titik sampel tanah mengikuti isoterm Freundlich dengan kapasitas optimum pada konsentrasi 50 mg kg^{-1}. Desorpsi logam Zn dari semua titik sampel tanah mencapai nilai optimum pada konsentrasi asam sitrat 0,7 mol L^{-1} dan dilakukan pada pH 3. Uji toksisitas logam Zn menunjukkan bahwa logam Zn pada konsentrasi eluat 4,85 mg L^{-1} bersifat racun pada pertumbuhan bayam hijau dan kacang hijau.

Kata kunci: adsorpsi, desorpsi, fisika-kimia, logam seng, uji toksisitas.

STUDY OF SOIL PHYSICAL-CHEMICAL PARAMETERS AROUND THE TEXTILE INDUSTRY IN BANTUL AND TOXICITY TEST USING GREEN SPINACH SEEDS (Amaranthus viridis) AND MUNG BEAN (Vigna radiata)

Siti Alysha Astari

18/448783/PPA/05866

ABSTARCT

Study of soil physical-chemical parameters around the textile industry in Bantul and toxicity test on the growth of green spinach (*Amaranthus viridis*) and mung bean (*Vigna radiata*) has been carried out. The aims of this research were to study the physico-chemical properties and heavy metal content, to study the adsorption and desorption of zinc metal and to examine the toxicity of zinc metal in the soil around the textile industry on the growth of spinach and bean sprouts.

Soil samples were divided into three groups based on the locations they were taken, namely sample points I, II, and III. The physico-chemical properties studied included water content, soil acidity (pH), electrical conductivity, ash content, total organic carbon, cation exchange capacity, heavy metal content in soil and characterization of soil samples using Fourier Transform Infrared Spectroscopy (FTIR). The adsorption capacity of the soil is known from the adsorption process of Zn by soil samples at various concentrations of Zn. The desorption kinetics of Zn metal from soil samples was studied by doing desorption of Zn with citric acid solutions at various concentrations. Metal concentrations in the solution were determined by an Atomic Absorption Spectrophotometer (AAS). Toxicity test was carried out on the growth of green spinach and mung bean.

The results showed that soil sample point I had the highest Zn metal content with the value of 532.03 ± 16.79 mg kg^{-1}. The adsorption of Zn metal by all investigated soil samples followed the Freundlich isotherm models with the optimum value achieved at a concentration of 50 mg kg^{-1}. The desorption of Zn metal from all investigated samples reached its optimum value if a citric acid with the concentration of 0.7 mol L^{-1} was used and done at pH 3. Toxicity test of Zn metal showed that high concentration of zinc metal eluate 4.85 mg L^{-1} was toxic to the growth of green spinach and mung bean.

Keywords: adsorption, desorption, physic-chemistry, toxicity test