

Studi bioavailabilitas logam berat (Cu dan Zn) dalam tanah secara ekstraksi bertahap dan diffusive gradient in thin films (DGT) serta penyerapannya pada kangkung darat (*Ipomea reptans* Poir.) = Study of bioavailabilty heavy metals (Cu and Zn) in soil by mean of sequential extraction and diffusive gradient in thin films (DGT) and Its absorption into *Ipomea reptans* Poir

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Abstrak

[Pada studi ini, logam berat tembaga (Cu) dan seng (Zn) pada tanah diukur menggunakan ekstraksi bertahap dan metode diffusive gradient in thin films (DGT), selain itu penyerapan logam tersebut pada tanaman kangkung darat diinvestigasi. Spesiasi Cu dan Zn pada tanah asli (non spike) dan tanah spike 200, 400, 600, dan 800 mg kg⁻¹ tanah dievaluasi dengan ekstraksi bertahap yang didasari prosedur Tessier (1979), diperoleh distribusi logam pada fraksi yang berbeda-beda. Cu dan Zn pada tanah asli ditemukan terutama pada fraksi Mn oksida, Fe oksida dan residu. Sangat sedikit ditemukan pada fraksi exchangeable yang merupakan fraksi logam paling mobile dan diasosiasikan sebagai bioavailabel. Pada tanah yang diberi spike Cu dan spike Zn juga ditemukan terutama pada fraksi Mn oksida dan Fe Oksida, terlihat peningkatan cukup signifikan pada fraksi karbonat, dan khusus untuk tanah yang diberi spike Zn terlihat peningkatan cukup signifikan terhadap fraksi exchangeable. Metode DGT digunakan untuk menentukan konsentrasi efektif (CE) dari Cu dan Zn pada tanah. Hubungan antara CE dari Cu dan Zn oleh DGT dan serapan Cu dan Zn pada kangkung darat yang ditumbuhkan dalam rumah kaca dievaluasi. Hubungan CE dari Zn terhadap serapan Zn pada kangkung darat berkorelasi secara signifikan pada pemberian konsentrasi spike Zn²⁺ 0 (kontrol) 200, 400, 600, dan 800 mg kg⁻¹ tanah (R² = 0,97) dan memberikan hubungan linear yang positif. Namun, pada variasi konsentrasi spike Cu²⁺ yang sama, CE dari Cu tidak berkorelasi terhadap serapan Cu pada kangkung darat (R² = 0,43) dan memberikan hubungan linear yang negatif. Hal ini kemungkinan disebabkan konsentrasi spike Cu yang digunakan terlalu tinggi atau berada pada level toksik.; In this study, heavy metals copper (Cu) and zinc (Zn) in soil were measured using the method of sequential extraction and diffusive gradient in thin films (DGT), in addition to the absorption of these metals in *Ipomea reptans* Poir. were investigated. Speciation of Cu and Zn in native soil (non-spike) and spiked-soil 200, 400, 600, and 800 mg kg⁻¹ soil were evaluated by the sequential extraction procedure based on Tessier (1979), obtained the metal distribution in different fractions. Cu and Zn in the native soil is found mainly in the fraction of Mn oxides, Fe oxides and residues. Very little was found in exchangeable fraction which is the most mobile metal fraction and associated bioavailable. In spiked-soil, Cu and Zn were also found mainly in the fraction of Mn oxides and Fe oxides, seen a significant increase in the fraction of carbonate, and specifically for a given soil Zn spike seen a significant increase in the exchangeable fraction. DGT method used to determine the effective concentration (CE) of Cu and Zn in soil. The relationship between Cu and Zn from the CE by the DGT and the uptake of Cu and Zn in *Ipomea reptans* Poir. grown in a greenhouse were evaluated. The relationship CE of Zn with Zn absorption by *Ipomea reptans* Poir. were significantly correlated to the spike concentration giving Zn²⁺ 0 (control) 200, 400, 600, and 800 mg kg⁻¹ soil (R² = 0.97) and provide a positive linear relationship. However, with the spike Cu²⁺ at the same variation of concentration, CE of Cu

did not correlate to the absorption of Cu in *Ipomea reptans* Poir. ($R^2 = 0.43$) and give a negative linear relationship. This is probably due to Cu spike concentration used is too high or are at toxic levels., In this study, heavy metals copper (Cu) and zinc (Zn) in soil were measured using the method of sequential extraction and diffusive gradient in thin films (DGT), in addition to the absorption of these metals in *Ipomea reptans* Poir. were investigated. Speciation of Cu and Zn in native soil (non-spike) and spiked-soil 200, 400, 600, and 800 mg kg⁻¹ soil were evaluated by the sequential extraction procedure based on Tessier (1979), obtained the metal distribution in different fractions. Cu and Zn in the native soil is found mainly in the fraction of Mn oxides, Fe oxides and residues. Very little was found in exchangeable fraction which is the most mobile metal fraction and associated bioavailable. In spiked-soil, Cu and Zn were also found mainly in the fraction of Mn oxides and Fe oxides, seen a significant increase in the fraction of carbonate, and specifically for a given soil Zn spike seen a significant increase in the exchangeable fraction. DGT method used to determine the effective concentration (CE) of Cu and Zn in soil. The relationship between Cu and Zn from the CE by the DGT and the uptake of Cu and Zn in *Ipomea reptans* Poir. grown in a greenhouse were evaluated. The relationship CE of Zn with Zn absorption by *Ipomea reptans* Poir. were significantly correlated to the spike concentration giving Zn²⁺ 0 (control) 200, 400, 600, and 800 mg kg⁻¹ soil ($R^2 = 0.97$) and provide a positive linear relationship. However, with the spike Cu²⁺ at the same variation of concentration, CE of Cu did not correlate to the absorption of Cu in *Ipomea reptans* Poir. ($R^2 = 0.43$) and give a negative linear relationship. This is probably due to Cu spike concentration used is too high or are at toxic levels.]