INTISARI

Bahan organik tanah memiliki peranan yang sangat penting dalam memengaruhi sifat fisik, kimia, dan biologi tanah. Bahan organik dalam tanah berada dalam berbagai bentuk fraksi, salah satunya dapat membentuk kompleks dengan mineral tanah. Pengompleksan bahan organik oleh berbagai macam bentuk mineral akan berpengaruh terhadap waktu tinggal (*residence time)* senyawa tersebut. Penelitian ini bertujuan untuk mengetahui distribusi fraksi-fraksi organomineral pada kedalaman tanah 0-20 cm dan 20-40 cm di berbagai lereng pada formasi Kebobutak, Kulon Progo. Sampel tanah diambil dari posisi puncak, lereng atas, lereng tengah, lereng bawah, dan kaki lereng dengan masing-masing kedalaman 0-20 cm dan 20-40 cm. Parameter sifat fisika dan kimia yang diukur meliputi berat volume, tekstur tanah, pH H_2O, pH KCl, KPK, C-organik, N-total, dan rasio C/N serta analisis fraksi organomineral. Analisis data dilakukan dengan uji Anova (*Analysis of Variance*), uji lanjut *Tukey*, dan analisis regresi-korelasi. Hasil penelitian menunjukkan bahwa posisi lereng dan kedalaman tanah berpengaruh signifikan terhadap distribusi fraksi organomineral tanah. Fraksi Fe *oxyhydroxides-stabilized* OM, Fe/Al-OM *complexes*, dan *carbonate-occluded* OM mendominasi di sebagian besar posisi lereng dan lebih tinggi pada kedalaman 0-20 cm dibandingkan 20-40 cm. Zona residu atau deposisi (puncak, lereng tengah, dan kaki lereng) menunjukkan proses stabilisasi bahan organik yang terikat kuat, sedangkan zona erosi (lereng atas dan bawah) masih mengandung fraksi tersebut disertai peningkatkan fraksi terikat lemah seperti *weakly adsorbed* OM dan *water soluble* OM. Hasil ini menegaskan bahwa dinamika lereng dan kedalaman tanah berperan penting dalam proses stabilisasi bahan organik dengan mineral tanah serta mendukung strategi konservasi tanah untuk menjaga karbon organik dalam jangka panjang.

Kata kunci: fraksi, kedalaman, lereng, organomineral, tanah

ABSTRACT

Soil organic matter plays a crucial role in influencing the physical, chemical, and biological properties of soils. In the soil system, organic matter exists in various fractions, one of which can form complexes with soil minerals. The complexation of organic matter by different types of minerals affects its residence time in the soil. This study aims to determine the distribution of organomineral fractions at depths of 0-20 cm and 20-40 cm across different slope positions within the Kebobutak Formation, Kulon Progo. Soil samples were collected from the summit, upper slope, middle slope, lower slope, and footslope positions at depths of 0–20 cm and 20–40 cm. The measured physical and chemical parameters included bulk density, soil texture, pH (H_2O and KCl), cation exchange capacity (CEC), organic carbon, total nitrogen, and C/N ratio, along with organomineral fraction analysis. Data were analyzed using ANOVA (Analysis of Variance), Tukey's post-hoc test, and regression-correlation analysis. The results showed that slope position and soil depth significantly affected the distribution of organomineral fractions. The Fe oxyhydroxide-stabilized OM, Fe/Al–OM complexes, and carbonate-occluded OM fractions dominated most slope positions and were higher at the 0-20 cm depth compared to the 20-40 cm depth. Residual or depositional zones (summit, middle slope, and footslope) exhibited stronger organic matter stabilization, while erosional zones (upper and lower slopes) contained these fractions along with increased weakly adsorbed OM and water-soluble OM. These findings highlight that slope dynamics and soil depth play a crucial role in the stabilization process of soil organic matter through mineral interactions, supporting soil conservation strategies to maintain long-term organic carbon storage.

Keywords: depth, fraction, organomineral, slope, soil