INTISARI

Penelitian ini bertujuan untuk mengetahui pengaruh sistem budidaya tanaman sayuran yang dikelola secara organik, semi organik, dan konvensional terhadap fraksi karbon labil dan stabil dalam tanah Andisol lereng utara Merbabu. Sampel tanah diambil dari ketiga sistem budidaya tanaman sayuran tersebut dengan masing-masing kedalaman 0-20, 20-40, dan 40-60 cm. Parameter yang diukur melingkupi sifat fisika, kimia, dan biologi tanah. Sifat fisik-kimia tanah yang dianalisis meliputi tekstur, berat volume, pH-H_2O, pH-NaF, bahan organik, KPK, N-total, Al/Fe terekstrak oksalat dan pirofosfat. Fraksi karbon yang dianalisis meliputi C-POM, C-larut air, C-termineralisasi, C-BMT, asam humat dan asam fulvat. *Analysis of Variance(Anova*) dilakukan untuk mengetahui pengaruh sistem budidaya dan kedalaman tanah terhadap sifat fisik-kimia tanah, sedangkan perbedaan antar dua rerata perlakuan dianalisis dengan DMRT. Analisis regresi-korelasi dilakukan untuk mengetahui hubungan keeratan antara variabel bebas dan bergantung. Hasil penelitian menunjukkan bahwa sistem budidaya pertanian dan kedalaman tanah berpengaruh nyata terhadap sifat fisik dan kimia tanah. Parameter sifat kimia tanah yang berpengaruh nyata terhadap sistem budidaya pertanian dan kedalaman tanah adalah pH-H_2O, pH NaF, bahan organik, KPK, N-total, Al/Fe terekstrak pirofosfat. Parameter yang tidak berpengaruh nyata terhadap sistem budidaya pertanian dan kedalaman tanah adalah Al/Fe terekstrak oksalat dan nisbah C/N. Sistem budidaya pertanian organik memiliki fraksi C-organik dalam bentuk labil dan stabil lebih dominan dibandingkan sistem budidaya pertanian semi organik, dan konvensional. Parameter sifat kimia tanah yaitu bahan organik, C-organik, N-total berhubungan erat dengan C-POM, C-larut air, C-BMT, C-mineralisasi, asam humat, dan asam fulvat tanah. Sistem budidaya pertanian organik terbukti dapat memperbaiki sifat fisik dan kimia tanah karena mendapatkan masukan bahan organik lebih banyak dibandingkan sistem budidaya pertanian semi organik dan konvensional dalam meningkatkan ketersediaan fraksi C-organik di tanah Andisol.

Kata kunci: Fraksi karbon labil, karbon stabil, sistem budidaya pertanian

ABSTRACT

This study aims to find out the effect of vegetable cultivation systems that are managed organically, semi-organic, and conventionally on the unstable and stable carbon fraction of Andisol soil on the north slope of Merbabu. Field research was carried out using a sampling method in 3 different farming systems, namely organic (O), semi-organic (SO), and conventional (K) and 3 soil depths, namely 0-20 cm, 20-40 cm, and 40-60 cm. The parameters measured include the physical, chemical, and biological properties of the soil. The physicochemical properties of the soil analyzed included texture, volume weight of soil, pH-H2O, pH-NaF, organic matter, cation exchange capacity, total-N, Al/Fe extracted oxalate and pyrophosphate. The carbon fractions analyzed included particulate organic matter carbon, water-soluble carbon, soil organic carbon mineralization, microbial biomass carbon, humic acid, and fulvic acid. Analysis of Variance (ANOVA) was conducted to determine the effect of farming system and soil depth on soil physicochemical properties, while the difference between the two treatment means was analyzed by DMRT. Regression-correlation analysis was carried out to determine the close relationship between the independent and dependent variables. The results showed that the farming system and soil depth had a significant effect on soil physical and chemical properties. Parameters of soil chemical properties that significantly affect the farming system and soil depth are pH-H2O, pH NaF, organic matter, cation exchange capacity, total-N, and Al/Fe pyrophosphate extracted. Parameters that have no significant effect on farming systems and soil depth are Al/Fe oxalate extracted and C/N ratio. Organic farming systems have an unstable and stable organic carbon fraction that is more dominant than semi-organic and conventional farming systems. Parameters of soil chemical properties such as organic matter, total organic carbon, and total-N are closely related to particulate organic matter carbon, water-soluble carbon, microbial biomass carbon, soil organic carbon mineralization, soil humic and fulvic acid. The organic farming system has been proven to improve the physical and chemical properties of the soil because it gets more organic matter input than semi-organic and conventional farming systems in increasing the availability of organic carbon fraction in Andisol soil.

Keywords: unstable carbon fraction, stable carbon, farming system