INTISARI

Andisols merupakan salah satu jenis tanah yang memiliki permasalahan utama berupa rendahnya ketersediaan fosfor (P) akibat adanya ikatan kuat oleh mineral non-kristalin, seperti *allophane, imogolite, ferrihydrite*, serta Al dan Fe amorf. Kondisi ini menyebabkan diperlukan upaya ameliorasi untuk memutus atau mengurangi ikatan tersebut melalui penambahan bahan pembenah tanah seperti biochar, kompos, dan silika. Penelitian ini bertujuan untuk mempelajari pola jerapan dan pelepasan fosfat serta perubahan sifat-sifat tanah yang memengaruhi dinamika unsur P dalam upaya meningkatkan pertumbuhan dan produktivitas tanaman jagung manis di Andisols. Penelitian dilaksanakan pada bulan Oktober 2024 sampai Juni 2025 di Desa Sumberejo, Kecamatan Ngablak, Kabupaten Magelang. Percobaan disusun menggunakan Rancangan Acak Kelompok Lengkap (RAKL) dengan tiga faktor, yaitu: biochar (0 ton.ha^{-1} and 10 ton.ha^{-1}), kompos (0 ton.ha^{-1} and 5 ton.ha^{-1}), serta silika (0 kg.ha^{-1}, 1 kg.ha^{-1}, dan 2 kg.ha^{-1}). Terdapat 12 kombinasi perlakuan dengan tiga ulangan sehingga diperoleh 36 unit percobaan. Hasil penelitian menunjukkan bahwa kombinasi perlakuan biochar 10 ton.ha^{-1}, kompos 5 ton.ha^{-1}, dan silika 2 kg.ha^{-1} memberikan pengaruh yang signifikan terhadap pH H_2O, C-organik, P-tersedia, P-retensi, kandungan asam fulvat, Si aktif, diameter batang, biomassa tanaman, kadar P, serta serapan P tanaman jagung manis. Pemberian biochar, kompos, dan silika secara sinergis mampu menurunkan jerapan P sekaligus meningkatkan pelepasan P.

Kata Kunci: Biochar bambu, jerapan P, kompos limbah padat kelapa sawit, pelepasan P, silika

ABSTRACT

Andisols are characterized by a major constraint in terms of phosphorus availability, which is limited due to the strong binding by non-crystalline minerals such as allophane, imogolite, ferrihydrite, and amorphous Al/Fe. Therefore, soil amendments are required to modify these bindings through the application of biochar, compost, and silica. This study aimed to investigate the patterns of phosphate adsorption and desorption as well as the differences in soil properties that influence P dynamics in improving the growth and productivity of sweet corn in Andisols with the application of biochar, compost, and silica. The research was conducted from October 2024 to June 2025 in Sumberejo Village, Ngablak District, Magelang Regency. The experiment was arranged in a three-factor Randomized Complete Block Design (RCBD), resulting in 12 treatment combinations with three replications, for a total of 36 experimental units. The first factor was biochar (0 ton.ha^{-1} and 10 ton.ha^{-1}). The second factor was compost (0 ton.ha^{-1} and 5 ton.ha^{-1}). The third factor was silica (0 kg.ha^{-1}, 1 kg.ha^{-1}, and 2 kg.ha^{-1}). The results showed that the application of 10 ton.ha^{-1} biochar, 5 ton.ha^{-1} compost, and 2 kg.ha^{-1} silica significantly affected soil pH H_2O, organic C, available P, P retention, fulvic acid, active Si, stem diameter, plant biomass, P content, and P uptake in sweet corn. The combined application of biochar, compost, and silica synergistically reduced P adsorption and enhanced P desorption.

Keywords: Bamboo biochar, palm soilid waste compost, P adsorption, P desorption, silica.