

RINGKASAN

Jagung manis (*Zea mays saccharata* Sturt.) merupakan salah satu komoditas pangan yang penting bagi perekonomian Indonesia. Produktivitas jagung manis mengalami penurunan disebabkan karena berkurangnya lahan-lahan produktif. Lahan kering yaitu tanah Ultisol berpotensi sebagai tempat budidaya jagung manis. Namun, tanah tersebut memiliki kandungan bahan organik rendah, kejenuhan Al tinggi, pH masam, dan unsur P rendah. Bahan organik perlu ditambahkan pada tanah Ultisol melalui pupuk organik kasgot. Kasgot merupakan residu dari biokonversi sampah organik oleh *Black Soldier Fly* (BSF). Namun, parameter P-total belum memenuhi standar mutu Kepmentan RI No. 261/KPTS/SR.310/M/4/2019 tentang Persyaratan Teknis Minimal Pupuk Organik, Pupuk Hayati, dan Pembenh Tanah. Penambahan pupuk P (SP-36) bertujuan untuk menyediakan unsur P secara cepat karena sifatnya mudah larut. Penelitian ini bertujuan untuk (1) mengetahui dosis optimum pupuk P dan kasgot yang diperkaya biochar, zeolit, dan legum untuk meningkatkan pertumbuhan dan hasil tanaman jagung manis di tanah Ultisol (2) mengetahui interaksi aplikasi dosis P dan kasgot yang diperkaya biochar, zeolit, dan legum terhadap respon fisiologis tanaman jagung manis di tanah Ultisol.

Kegiatan penelitian dilaksanakan pada bulan Agustus 2024-Februari 2025. Penelitian ini menggunakan Rancangan Acak Kelompok Lengkap (RAKL) dengan 2 faktor dan 3 ulangan. Faktor pertama meliputi P0 = kontrol (tanpa aplikasi P), P1 = 25 kg ha⁻¹ P₂O₅, P2 = 50 kg ha⁻¹ P₂O₅, P3 = 75 kg ha⁻¹ P₂O₅. Faktor kedua meliputi K0 = kontrol (tanpa kasgot), K1 = 10 ton ha⁻¹, K2 = 20 ton ha⁻¹, K3 = 30 ton ha⁻¹. Variabel yang diamati yaitu luas daun (cm²), lebar bukaan stomata (μm) dan kerapatan stomata (unit mm⁻²), klorofil a; klorofil b; dan klorofil total, panjang akar total (cm), bobot akar (g), bobot kering tanaman (g), laju asimilasi bersih (g dm⁻² minggu⁻¹), bobot daun khas (g dm⁻²), rasio tajuk akar, serapa p (mg tanaman⁻¹), dan diameter tongkol (cm); bobot tongkol berkelobot (g); serta panjang tongkol (g). Data hasil penelitian dianalisis menggunakan uji ANOVA, jika berpengaruh nyata maka dilanjutkan uji *Duncan's Multiple Range Test* (DMRT) pada taraf kesalahan 5%.

Hasil analisis kandungan unsur hara kasgot menunjukkan terdapat beberapa parameter yang belum memenuhi standar Kepmentan RI No. 261/KPTS/SR.310/M/4/2019 dikarenakan udara yang masuk ketika proses fermentasi. Hasil penelitian menunjukkan bahwa tidak ada interaksi aplikasi P dan kasgot. Aplikasi kasgot berpengaruh terhadap luas daun, panjang akar total, bobot kering tanaman, laju asimilasi bersih, laju pertumbuhan relatif, bobot daun khas, rasio tajuk akar, kadar klorofil b, serapan P, dan panjang serta bobot tongkol berkelobot. Aplikasi P berpengaruh pada luas daun, kadar klorofil b dan total, serta panjang akar total. Dosis optimum kasgot untuk meningkatkan pertumbuhan dan hasil jagung manis di tanah Ultisol sebesar 20,36 ton/ha.

SUMMARY

Sweet corn (*Zea mays saccharata* Sturt.) is one of the important food commodities for the Indonesian economy. Sweet corn productivity has declined due to a reduction in productive land. Dry land, specifically Ultisol soil, has potential as a site for sweet corn cultivation. However, this soil has low organic matter content, high aluminum saturation, acidic pH, and low phosphorus content. Organic matter needs to be added to Ultisol soil through organic fertilizer made from maggot frass. Maggot frass is the residue from the bioconversion of organic waste by the Black Soldier Fly (BSF). However, the total phosphorus parameter does not yet meet the quality standards of Ministry of Agriculture Regulation No. 261/KPTS/SR.310/M/4/2019 on Minimum Technical Requirements for Organic Fertilizers, Biofertilizers, and Soil Conditioners. The addition of phosphorus fertilizer aimed to provide phosphorus quickly due to its water-soluble nature. This study were aimed to (1) determine the optimal dose of P fertilizer and biochar-enriched compost, zeolite, and legumes to enhance the growth and yield of sweet corn in Ultisol soil (2) investigate the interaction between P fertilizer application rates and biochar-enriched compost, zeolite, and legumes on the physiological response of sweet corn in Ultisol soil.

The research activities were carried out from August 2024 to February 2025. This study used a Completely Randomized Block Design (CRBD) with two factors and three replications. The first factor included P0 = control (no P application), P1 = 25 kg ha⁻¹P₂O₅, P2 = 50 kg ha⁻¹P₂O₅, P3 = 75 kg ha⁻¹P₂O₅. The second factor includes K0 = control (without maggot frass), K1 = 10 tons ha⁻¹, K2 = 20 tons ha⁻¹, K3 = 30 tons ha⁻¹. The observed variables were leaf area (cm²), stomatal aperture width (μm), and stomatal density (units mm⁻²), chlorophyll a, chlorophyll b, and total chlorophyll, total root length (cm), root weight (g), dry plant weight (g), net assimilation rate (g dm⁻² week⁻¹), specific leaf weight (g dm⁻²), root shoot ratio, P uptake (mg plant⁻¹), and cob diameter (cm); cob weight (g); and cob length (g). The research data were analyzed using ANOVA. If there was a significant effect, Duncan's Multiple Range Test at a 5%.

The analysis of maggot frass nutrient content showed that several parameters did not meet the standards of Ministry of Agriculture Regulation No. 261/KPTS/SR.310/M/4/2019 due to water content during the fermentation process. The results of the research showed that there was no interaction between P and maggot frass. Maggot frass application affected leaf area, total root length, dry plant weight, net assimilation rate, relative growth rate, specific leaf weight, root-to-shoot ratio, chlorophyll b content, P uptake, and cob length and weight. P application affected leaf area, chlorophyll b content and total chlorophyll, and total root length. The optimal dose to enhance growth and yield of sweet corn in Ultisol soil was 20.36 tons ha⁻¹.