

RINGKASAN

Padi gogo merupakan komoditas strategis dalam mendukung ketahanan pangan nasional, terutama di wilayah lahan kering yang didominasi tanah Inceptisol. Produktivitas padi gogo pada kondisi tersebut rendah akibat kemasaman tanah, kandungan bahan organik yang minim, dan rendahnya efisiensi pemupukan. Upaya perbaikan dapat dilakukan melalui penggunaan pupuk organik seperti kasgot yang mampu memperbaiki sifat fisik, kimia, dan biologi tanah, serta pemberian pupuk anorganik N, P, K sebagai sumber hara makro esensial. Penelitian ini bertujuan untuk (1) mengkaji pengaruh aplikasi pupuk kasgot terhadap karakteristik fisiologi dan efisiensi pemupukan tanaman padi gogo di tanah Inceptisol, (2) mengkaji pengaruh dosis pupuk N, P, K terhadap karakteristik fisiologi dan efisiensi pemupukan tanaman padi gogo di tanah Inceptisol, (3) mengkaji interaksi antara aplikasi pupuk kasgot dan dosis pupuk N, P, K terhadap karakteristik fisiologi dan efisiensi pemupukan tanaman padi gogo di tanah Inceptisol.

Penelitian dilaksanakan bulan Mei hingga November 2025 bertempat di Kebun percobaan dan Laboratorium Agronomi dan Hortikultura Fakultas Pertanian, Universitas Jenderal Soedirman, dengan ketinggian 110 mdpl, yang memiliki karakteristik tanah Inceptisol. Percobaan menggunakan Rancangan Acak Kelompok Lengkap (RAKL) faktorial dua faktor, yaitu pupuk kasgot (A0 = 0 ton/ha, A1 = 10 ton/ha, A2 = 20 ton/ha) dan pupuk N, P, K (P0 = 0 kg/ha, P1 = 87,5 kg/ha, P2 = 175 kg/ha, P3 = 350 kg/ha, P4 = 437,5 kg/ha, P5 = 525 kg/ha), dengan tiga ulangan. Variabel yang diamati meliputi parameter pertumbuhan (tinggi tanaman, luas daun, jumlah anakan, panjang akar, bobot kering tanaman), parameter fisiologi (kadar klorofil, kerapatan stomata, lebar bukaan stomata, rasio akar tajuk), parameter hasil (jumlah gabah per malai, bobot gabah per tanaman, indeks panen). Variabel tambahan berupa serapan hara N, P, K serta efisiensi pemanfaatan pupuk. Data dianalisis menggunakan sidik ragam (ANOVA) dan apabila berbeda nyata dilakukan uji lanjut menggunakan metode *Duncan Multiple Range Test* (DMRT) pada taraf kesalahan 5%.

Hasil penelitian menunjukkan bahwa aplikasi pupuk kasgot berpengaruh terhadap jumlah anakan 5 MST dan serapan nitrogen, serta berpengaruh sangat nyata terhadap serapan fosfor dan serapan kalium, sedangkan parameter lainnya tidak menunjukkan pengaruh yang signifikan. Aplikasi dosis pupuk N, P, K memberikan pengaruh terhadap bobot gabah per tanaman, serta berpengaruh sangat nyata terhadap serapan nitrogen, fosfor, dan kalium, serta efisiensi pemanfaatan pupuk N, P, dan K, yang mengindikasikan bahwa unsur hara makro N, P, K berperan utama dalam mendukung proses fisiologis dan pembentukan hasil padi gogo. Interaksi antara aplikasi kasgot dan dosis pupuk N, P, K berpengaruh terhadap kerapatan stomata, serapan fosfor, serapan kalium, efisiensi fisiologi nitrogen, serta efisiensi pemanfaatan pupuk fosfor. Kombinasi perlakuan kasgot 20 ton/ha dengan dosis pupuk N, P, K 350 kg/ha memberikan hasil terbaik yang ditunjukkan oleh peningkatan efisiensi sehingga mendukung proses fisiologis tanaman dan berdampak pada peningkatan bobot gabah per tanaman.

SUMMARY

Upland rice is a strategic commodity in supporting national food security, especially in dryland areas dominated by Inceptisol soil. Upland rice productivity in these conditions tends to be low due to soil acidity, low organic matter content, and low fertilizer efficiency. Improvement efforts can be made through the use of organic fertilizers such as maggot frass which can improve the physical, chemical, and biological property of the soil, as well as the provision of inorganic N, P, K fertilizers as a source of essential macronutrients. This study aims to (1) study the effect of maggot frass fertilizer application on the physiological characteristics and fertilizer efficiency of upland rice plants on Inceptisol soil, (2) study the effect of N, P, and K fertilizer doses on the physiological characteristics and fertilizer efficiency of upland rice plants on Inceptisol soil, (3) study the interaction between maggot frass fertilizer application and N, P, and K fertilizer doses on the physiological characteristics and fertilizer efficiency of upland rice plants on Inceptisol soil.

The experiment was conducted from May to November 2025 at the Screenhouse of the Experimental Farm Laboratory and the Agronomy and Horticulture Laboratory of the Faculty of Agriculture, Jenderal Soedirman University, at an altitude of 105 meters above sea level, which has Inceptisol soil characteristics. The experiment used a two-factorial Randomized Complete Block Design (RAKL), namely maggot frass fertilizer (A0 = 0 tons/ha, A1 = 10 tons/ha, A2 = 20 tons/ha) and N, P, K fertilizer (P0 = 0 kg/ha, P1 = 87.5 kg/ha, P2 = 175 kg/ha, P3 = 350 kg/ha, P4 = 437.5 kg/ha, P5 = 525 kg/ha), with three replications. Observed variables included growth parameters (plant height, leaf area, tiller number, root length, plant dry weight), physiological parameters (chlorophyll content, relative growth rate, net assimilation rate, stomatal density, stomatal aperture width, root-to-crop ratio), and yield parameters (number of grains per panicle, grain weight per plant, harvest index). Additional variables included N, P, and K nutrient uptake and fertilizer utilization efficiency. Data were analyzed using ANOVA, followed by a Duncan Multiple Range Test (DMRT) if significant effects were observed at the 5% level.

The results showed that maggot frass application affected tiller number at 5 weeks after planting and nitrogen uptake, and significantly affected phosphorus and potassium uptake. N, P, and K fertilizer application affected grain weight per plant and significantly increased N, P, and K uptake and fertilizer efficiency. Their interaction affected stomatal density, phosphorus and potassium uptake, nitrogen physiological efficiency, and phosphorus fertilizer efficiency. The combination of 20 tons/ha maggot frass and 350 kg/ha N, P, and K fertilizer produced the best results, enhancing physiological efficiency and increasing grain weight per plant.