

## RINGKASAN

Peningkatan jumlah penduduk Indonesia berdampak pada meningkatnya kebutuhan beras nasional, sementara produksi padi sawah masih menghadapi kendala efisiensi pemupukan nitrogen yang rendah. Nitrogen merupakan unsur hara esensial yang berperan penting dalam pertumbuhan, fisiologi, dan hasil padi sawah, namun penggunaannya yang tidak tepat dapat menurunkan efisiensi serapan serta menimbulkan dampak negatif terhadap lingkungan. Penggunaan pupuk anorganik secara berkelanjutan juga berpotensi menurunkan kesuburan tanah akibat rendahnya kandungan bahan organik. Pupuk organik kasgot terformulasi yang diperkaya zeolit, biochar, dan hijauan legum berpotensi memperbaiki sifat tanah serta meningkatkan efisiensi pemupukan nitrogen. Penelitian ini bertujuan untuk mengkaji pengaruh dosis kasgot terformulasi dan nitrogen serta interaksinya terhadap karakter agronomi, fisiologi, dan efisiensi penggunaan nitrogen pada tanaman padi sawah. Hasil penelitian diharapkan memberikan dasar ilmiah dalam penerapan pemupukan nitrogen yang lebih efisien dan berkelanjutan.

Penelitian dilaksanakan di lahan sawah Desa Mujur Lor, Kecamatan Kroya, Kabupaten Cilacap pada tanah alluvial. Percobaan disusun menggunakan Rancangan Acak Kelompok Lengkap faktorial dengan dua faktor, yaitu dosis kasgot terformulasi dan dosis nitrogen. Dosis kasgot terformulasi terdiri atas tiga taraf yaitu K0 (0 ton/ha), K1 (10 ton/ha), K2 (20 ton/ha). Demikian pula dosis nitrogen terdiri dari tiga taraf yaitu N0 (0 kg/ha), N1 (150 kg/ha) dan N2 (300 kg/ha). Setiap kombinasi perlakuan diulang sebanyak tiga kali. Variabel yang diamati meliputi tinggi tanaman, luas daun, Indeks Luas Daun (ILD), bobot kering akar, klorofil daun, lebar bukaan stomata, kerapatan stomata, biomassa tanaman, laju asimilasi bersih, laju pertumbuhan tanaman, serapan N, ANR, efisiensi penggunaan N, efisiensi agronomi, efisiensi fisiologi, jumlah anakan total, jumlah anakan produktif, panjang malai, jumlah gabah per malai, persentase gabah isi/malai, bobot gabah/ha dan bobot 1,000 butir. Data dianalisis menggunakan analisis sidik ragam pada taraf 5 persen dan dilanjutkan dengan uji DMRT pada taraf 5 %.

Hasil penelitian menunjukkan bahwa aplikasi kasgot terformulasi dan nitrogen berpengaruh nyata terhadap karakter agronomis dan fisiologis tanaman padi sawah. Pemberian kasgot dosis 10 ton/ha mampu meningkatkan tinggi tanaman, luas daun, ILD dan bobot kering akar. Sementara dosis nitrogen 150 kg/ha mampu meningkatkan tinggi tanaman, luas daun, ILD, bobot kering tanaman dan bobot gabah per ha. Dosis nitrogen optimum untuk menghasilkan bobot gabah maksimum adalah 126 kg/ha. Pupuk nitrogen berperan dalam meningkatkan ketersediaan hara yang mendukung pembentukan biomassa dan hasil. Terdapat interaksi antara dosis kasgot terformulasi dan nitrogen pada beberapa parameter yaitu tinggi tanaman, serapan nitrogen dan efisiensi penggunaan nitrogen. Kombinasi perlakuan terbaik untuk tinggi tanaman adalah dosis kasgot 20 ton/ha dan dosis nitrogen 300 kg/ha dengan nilai 111,73 cm. Serapan nitrogen terbaik dicapai pada kombinasi dosis kasgot 10 ton/ha tanpa pemupukan nitrogen dengan nilai 0,610 g/tanaman. Efisiensi penggunaan nitrogen terbaik dicapai pada dosis kasgot 10 ton/ha dan dosis nitrogen 150 kg/ha dengan nilai 0,23%.

## SUMMARY

*The increasing population in Indonesia impacts the rising national rice demand, while the production of paddy fields still faces challenges related to low nitrogen fertilization efficiency. Nitrogen is an essential nutrient that plays a crucial role in the growth, physiology, and yield of paddy rice; however, improper usage can decrease absorption efficiency and have negative environmental impacts. The sustainable use of inorganic fertilizers also has the potential to reduce soil fertility due to low organic matter content. Formulated organic fertilizers enriched with zeolite, biochar, and legume green manure have the potential to improve soil properties and increase nitrogen fertilization efficiency. This research aims to examine the effects of formulated organic fertilizer doses and nitrogen, as well as their interactions, on the agronomic and physiological characteristics and nitrogen use efficiency in paddy rice plants. The research results are expected to provide a scientific basis for the application of more efficient and sustainable nitrogen fertilization.*

*The study was conducted in the rice fields of Mujur Lor Village, Kroya District, Cilacap Regency, on alluvial soil. The experiments were arranged using a Complete Randomized Block Design (CRBD) factorial with two factors: doses of formulated organic fertilizer and nitrogen doses. The formulated organic fertilizer doses consisted of three levels: K0 (0 tons/ha), K1 (10 tons/ha), and K2 (20 tons/ha). Similarly, the nitrogen doses consisted of three levels: N0 (0 kg/ha), N1 (150 kg/ha), and N2 (300 kg/ha). Each combination of treatments was repeated three times. The observed variables included plant height, leaf area, Leaf Area Index (LAI), dry root weight, leaf chlorophyll, stomatal aperture, stomatal density, plant biomass, net assimilation rate, plant growth rate, nitrogen absorption, ANR, nitrogen use efficiency, agronomic efficiency, physiological efficiency, total tillers, productive tillers, panicle length, grains per panicle, percentage of filled grains per panicle, grain weight per ha, and 1,000-grain weight. Data were analyzed using analysis of variance at a 5% significance level, followed by the DMRT test at a 5% level.*

*The research results showed that the application of formulated organic fertilizer and nitrogen had a significant effect on the agronomic and physiological characteristics of paddy rice plants. The application of 10 tons/ha of organic fertilizer was able to increase plant height, leaf area, LAI, and dry root weight. Meanwhile, a nitrogen dose of 150 kg/ha was able to increase plant height, leaf area, LAI, dry plant weight, and grain weight per ha. The highest grain weight per ha was achieved with a nitrogen dose of 150 kg/ha, reaching 8.71 tons. Nitrogen fertilizer plays a role in increasing nutrient availability that supports biomass formation and yield. There was an interaction between the doses of formulated organic fertilizer and nitrogen in several parameters, including plant height, nitrogen absorption, and nitrogen use efficiency. The best treatment combination for plant height was 20 tons/ha of organic fertilizer and 300 kg/ha of nitrogen, with a value of 111.73 cm. The best nitrogen absorption was achieved with a combination of 10 tons/ha of organic fertilizer without nitrogen fertilization, with a value of 0.610 g/plant. The best nitrogen use efficiency was achieved with 10 tons/ha of organic fertilizer and 150 kg/ha of nitrogen, with a value of 0.23%.*