

RINGKASAN

Edamame adalah jenis kacang-kacangan yang sudah banyak dikonsumsi di Indonesia. Kandungan gizi, tekstur lembut, rasa manis, dan ukuran yang besar serta tingginya permintaan di mancanegara menjadikan edamame penting untuk dikembangkan. Akan tetapi, luas tanam edamame masih terbatas dan produktivitas usaha tani edamame yang belum maksimal. Salah satu upaya mengatasi hal tersebut dapat dilakukan peningkatan kualitas lahan melalui peningkatan efisiensi penggunaan pupuk seperti aplikasi pupuk organik kotoran sapi dengan biochar dan pupuk N, P, K dosis rendah. Penelitian ini dapat menjadi informasi dan pedoman bagi petani untuk mendapatkan hasil produksi edamame yang maksimal dengan meminimalisir kerusakan lingkungan. Tujuan utama penelitian ini yaitu untuk mengetahui pengaruh aplikasi pupuk organik kotoran sapi dengan biochar dan pupuk N, P, K dosis rendah terhadap pertumbuhan dan hasil edamame.

Penelitian ini dilaksanakan di lahan Desa Pasir Kulon, Laboratorium Perlindungan Tanaman, dan Laboratorium Agroekologi Fakultas Pertanian Universitas Jenderal Soedirman terhitung dari bulan September - Desember 2024. Rancangan yang digunakan yaitu rancangan acak kelompok (RAK) faktorial dengan 2 faktor perlakuan. Faktor pertama yaitu aplikasi pupuk organik kotoran sapi (S) yang terdiri dari S1= dosis PO kotoran sapi 5 ton ha⁻¹ tanpa biochar, S2= dosis PO kotoran sapi 5 ton ha⁻¹ diperkaya biochar, S3= dosis PO kotoran sapi 10 ton ha⁻¹ tanpa biochar, S4= dosis PO kotoran sapi 10 ton ha⁻¹ diperkaya biochar. Faktor kedua yaitu aplikasi pupuk N, P, K berdasarkan rekomendasi yang terdiri dari P1= dosis NPK 50% dari rekomendasi (Urea 25 kg/ha, TSP = 37,5 kg/ha, dan KCL = 50 kg/ha), P2= dosis NPK 100% dari rekomendasi (Urea 50 kg/ha, TSP = 75 kg/ha, dan KCL = 100 kg/ha). Data hasil dianalisis dengan ANOVA, apabila berbeda nyata dilanjutkan dengan uji *Duncan's Multiples Range Test* (DMRT) taraf kesalahan 5%.

Hasil penelitian menunjukkan bahwa aplikasi pupuk organik kotoran sapi diperkaya biochar atau tanpa biochar memberikan dampak terhadap variabel pertumbuhan edamame diantaranya tinggi tanaman, luas daun, kadar klorofil, dan kerapatan stomata. Pupuk kotoran sapi dengan dosis 10 ton ha⁻¹ diperkaya biochar mampu meningkatkan tinggi tanaman sebesar 7,18%, luas daun sebesar 27,28%, kadar klorofil sebesar 19,85%, dan kerapatan stomata sebesar 6,81% dibandingkan dengan pupuk kotoran sapi dengan dosis 5 ton ha⁻¹ tanpa biochar. Aplikasi pupuk N, P, K tidak memberikan dampak terhadap seluruh variabel pertumbuhan kecuali luas daun dan kerapatan stomata. Aplikasi pupuk N, P, K dosis 50% mampu mempertahankan pertumbuhan tinggi tanaman, jumlah daun, diameter batang, kadar klorofil, dan bintil akar. Sementara aplikasi pupuk N, P, K dosis 100% mampu meningkatkan luas daun sebesar 10,55% dan kerapatan stomata sebesar 4,97%. Pada variabel hasil edamame aplikasi pupuk organik kotoran sapi diperkaya biochar atau tanpa biochar tidak memberikan dampak terhadap seluruh variabel pengamatan. Begitupula hasil dari perlakuan pupuk N, P, K dosis 50% dan 100% rekomendasi.

SUMMARY

Edamame is a type of legume consumed in Indonesia. Its nutritional content, soft texture, sweet taste, and large size, along with high demand internationally, make edamame important to develop. However, edamame planting area is still limited and edamame farming productivity is not optimal. One effort to overcome this is to improve land quality by increasing the efficiency of fertilizer use, such as the application of organic cow fertilizer with biochar and low-dose N, P, and K fertilizer. This research can provide information and guidelines for farmers to achieve maximum edamame production while minimizing environmental damage. The main objective of this study was to determine the effect of organic cow fertilizer with biochar and low-dose N, P, and K fertilizer on edamame growth and yield.

This research was conducted in Pasir Kulon Village, Plant Protection Laboratory, and Agroecology Laboratory, Faculty of Agriculture, Jenderal Soedirman University from September to December 2024. The design used was a factorial randomized block design (RAK) with 2 treatment factors. The first factor was the application of organic cow dung fertilizer (S) consisting of S1 = PO dose of 5 tons ha⁻¹ of cow dung without biochar, S2 = PO dose of 5 tons ha⁻¹ of cow dung enriched with biochar, S3 = PO dose of 10 tons ha⁻¹ of cow dung without biochar, S4 = PO dose of 10 tons ha⁻¹ of cow dung enriched with biochar. The second factor is the application of N, P, K fertilizer based on recommendations consisting of P1 = NPK dose 50% of the recommendation (Urea 25 kg/ha, TSP = 37.5 kg/ha, and KCL = 50 kg/ha), P2 = NPK dose 100% of the recommendation (Urea 50 kg/ha, TSP = 75 kg/ha, and KCL = 100 kg/ha). The resulting data were analyzed using ANOVA, if significantly different, continued with Duncan's Multiples Range Test (DMRT) with a 5% error rate.

The results showed that the application of organic cow fertilizer enriched with or without biochar had an impact on edamame growth variables including plant height, leaf area, chlorophyll content, and stomata density. Cow fertilizer with a dose of 10 tons ha⁻¹ enriched with biochar was able to increase plant height by 7.18%, leaf area by 27.28%, chlorophyll content by 19.85%, and stomata density by 6.81% compared to cow fertilizer with a dose of 5 tons ha⁻¹ without biochar. The application of N, P, K fertilizer did not have an impact on all growth variables except leaf area and stomata density. The application of N, P, K fertilizer at a dose of 50% was able to maintain the growth of plant height, number of leaves, stem diameter, chlorophyll content, and root nodules. Meanwhile, the application of N, P, K fertilizer at a dose of 100% was able to increase leaf area by 10.55% and stomata density by 4.97%. For edamame yield, the application of biochar-enriched or biochar-free cow fertilizer had no impact on any of the observed variables. Similarly, the results of N, P, and K fertilizer treatments at 50% and 100% of the recommended doses were similar.