RINGKASAN

Kopi robusta (*Coffea canephora*) merupakan salah satu jenis kopi yang banyak dibudidayakan di Indonesia dan menjadi salah satu komoditas unggulan. Kopi robusta merupakan salah satu jenis kopi yang umumnya dibudidayakan oleh petani di daerah dataran rendah (< 700 m dpl) karena relatif lebih tahan terhadap serangan penyakit karat daun bila dibandingkan dengan kopi jenis arabika (*Coffea arabica*). Penggunaan pupuk sintetis tak jarang digunakan pada saat kegiatan budidaya, sayangnya penggunaan pupuk sintetis dapat menyuburkan tanah dalam kurun waktu yang relatif singkat tetapi dapat mengakibatkan penurunan kesuburan tanah karena merubah sifat fisik, kimia, dan biologi tanah. Penelitian ini bertujuan untuk menjelaskan pengaruh pemberian biochar dan pupuk N, P, K terhadap pertumbuhan, fisiologi, dosis kombinasi biochar dan pupuk N, P, K terbaik untuk pertumbuhan tanaman, serta interaksinya terhadap respon fisiologi tanaman kopi robusta. Pada penelitian ini, diharapkan dapat berpengaruh nyata terhadap pertumbuhan dan fisiologi tanaman kopi robusta.

Penelitian ini dilakukan di lahan Desa Sikapat, Kecamatan Sumbang, Kabupaten Banyumas dengan luas lahan 1350 m^2 dan ketinggian 400 m dpl. Analisis fisiologi dilakukan di Laboratorium Agronomi dan Hortikultura Fakultas Pertanian Unsoed. Penelitian ini dimulai pada September 2023 sampai dengan Februari 2024. Metode percobaan yang digunakan yaitu Rancangan Acak Kelompok Lengkap dua faktor. Faktor pertama adalah perlakuan biochar yang terdiri atas tanpa biochar (B_0), 50 g (B_1), 100 g (B_2), dan 150 g (B_3). Faktor kedua adalah perlakuan pupuk N, P, K yang terdiri atas tanpa pupuk (P_0), 65 g (P_1), dan 130 (P_2). Faktor-faktor tersebut dikombinasikan dan diperoleh 12 kombinasi perlakuan dengan 2 tanaman per unit percobaan dan 3 kali ulangan sehingga didapatkan 72 unit percobaan. Variabel yang diamati berupa karakter morfologi dan fisiologi tanaman kopi robusta. Variabel morfologi meliputi tinggi tanaman (cm), diameter batang (cm), luas daun (cm^2), dan jumlah cabang (cabang). Variabel fisiologi meliputi kerapatan stomata (mm^2), lebar bukaan stomata (µm), kehijauan daun (unit), indeks luas daun, luas daun spesifik (cm^2/g), bobot daun khas (g), dan laju transpirasi (mm/detik).

Hasil penelitian menunjukkan bahwa faktor pemberian biochar berpengaruh nyata terhadap laju transpirasi. Faktor pemberian pupuk N, P, K berpengaruh nyata terhadap jumlah cabang, kehijauan daun, dan laju transpirasi. Terdapat interaksi antara pemberian biochar dan pupuk N, P, K terhadap tinggi tanaman, jumlah cabang, kerapatan stomata, kehijauan daun, dan laju transpirasi.

SUMMARY

Robusta coffee (*Coffea canephora*) is one type of coffee that is widely cultivated in Indonesia and is one of the leading commodities. Robusta coffee is one type of coffee that is generally cultivated by farmers in lowland areas (<700 m above sea level) because it is relatively more resistant to leaf rust disease attacks when compared to Arabica coffee (*Coffea arabica*). The use of synthetic fertilizers is often used during cultivation activities, unfortunately the use of synthetic fertilizers can fertilize the soil in a relatively short period of time but can result in decreased soil fertility because it changes the physical, chemical, and biological properties of the soil. This study aims to explain the effect of biochar and N, P, K fertilizers on growth, physiology, the best combination dose of biochar and N, P, K fertilizers for plant growth, and their interactions with the physiological response of robusta coffee plants. In this study, it is expected to have a significant effect on the growth and physiology of robusta coffee plants.

This research was conducted on the land of Sikapat Village, Sumbang District, Banyumas Regency with a land area of 1350 m2 and an altitude of 400 m above sea level. Physiological analysis was conducted at the Agronomy and Horticulture Laboratory, Faculty of Agriculture, Unsoed. This research began in September 2023 to February 2024. The experimental method used was a two-factor Complete Randomized Block Design. The first factor was the biochar treatment consisting of no biochar (B_0), 50 g (B_1), 100 g (B_2), and 150 g (B_3). The second factor was the N, P, K fertilizer treatment consisting of no fertilizer (P_0), 65 g (P_1), and 130 (P_2). These factors were combined and 12 treatment combinations were obtained with 2 plants per experimental unit and 3 replications so that 72 experimental units were obtained. The variables observed were the morphological and physiological characters of robusta coffee plants. Morphological variables include plant height (cm), stem diameter (cm), leaf area (cm_2), and number of branches (branches). Physiological variables include stomatal density (mm_2), stomatal opening width (μm), leaf greenness (unit), leaf area index, specific leaf area (cm^2/g), typical leaf weight (g), and transpiration rate (mm/second).

The results showed that the biochar application factor had a significant effect on the transpiration rate. The N, P, K fertilizer application factor had a significant effect on the number of branches, leaf greenness, and transpiration rate. There was an interaction between biochar application and N, P, K fertilizer on plant height, number of branches, stomatal density, leaf greenness, and transpiration rate.