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TUTUPAN KANOPI, KAPASITAS FISIOLOGIS DAN KOMPONEN HASIL KOPI ROBUSTA (Coffea canephora) AGROFORESTRI DI MENOREH OLEH ADIKA BENING NURANI 22/502623/PN/17953 FAKULTAS PERTANIAN UNIVERSITAS GADJAH MADA YOGYAKARTA 2026
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id

Tutupan kanopi merupakan komponen penting dalam sistem agroforestri yang memengaruhi kondisi mikroklimat, kapasitas fisiologis, dan pembentukan hasil tanaman kopi. Penelitian dilakukan untuk mengkaji hubungan tutupan kanopi terhadap kapasitas fisiologis dan komponen hasil kopi robusta (*Coffea canephora*) pada sistem agroforestri campuran di Pegunungan Menoreh. Penelitian menggunakan rancangan survei observasi komparatif dengan pendekatan cross-sectional melalui stratified purposive sampling. Tutupan kanopi dihitung dari citra UAV RGB menggunakan klasifikasi citra berbasis objek (Object-Based Image Analysis), hubungan antarparameter dianalisis menggunakan Stepwise Multiple Linear Regression, regresi linear, dan regresi kuadratik. Hasil penelitian menunjukkan bahwa variasi tutupan kanopi menghasilkan perbedaan kondisi mikroklimat yang diikuti oleh perubahan kapasitas fisiologis dan komponen hasil kopi. Komponen hasil berupa cabang produktif dan dompol produktif mencapai nilai maksimum pada tutupan kanopi 79,78%, sedangkan buah per dompol, kandungan klorofil total, suhu udara, kelembapan relatif, PPFD, dan C-organik tanah menunjukkan kondisi optimum pada tutupan kanopi 54,66%; sementara kadar lengas tanah optimum pada tutupan kanopi 97,43%. Produktivitas kopi paling konsisten dicapai pada kisaran tutupan kanopi sedang hingga tinggi (54,66–79,78%) karena mampu menjaga keseimbangan antara ketersediaan cahaya dan stabilitas mikroklimat. Tutupan kanopi berhubungan dengan kapasitas fisiologis dan komponen hasil kopi robusta secara tidak langsung melalui perubahan kondisi mikroklimat, sehingga pengelolaan agroforestri kopi lebih tepat diarahkan pada pemeliharaan konfigurasi tajuk yang seimbang daripada memaksimalkan maupun meminimalkan tutupan kanopi.

Kata kunci: Agroforestri; Citra UAV; Kopi Robusta; Tutupan kanopi.

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Canopy cover is an important component of agroforestry systems that influences microclimatic conditions, physiological capacity, and coffee yield formation. This study was conducted to examine the relationship between canopy cover and the physiological capacity and yield components of robusta coffee (*Coffea canephora*) in a mixed agroforestry system in the Menoreh Mountains. The research employed a comparative observational survey with a cross-sectional approach using stratified purposive sampling. Canopy cover was quantified from UAV RGB imagery using Object-Based Image Analysis (OBIA), while the relationships among variables were analyzed using Stepwise Multiple Linear Regression, linear regression, and quadratic regression. The results showed that variations in canopy cover created differences in microclimatic conditions, which were accompanied by changes in the physiological capacity and yield components of coffee. Yield components, namely productive branches and productive fruit clusters, reached their maximum values at 79.78% canopy cover, whereas fruits per cluster, total chlorophyll content, air temperature, relative humidity, photosynthetic photon flux density (PPFD), and soil organic carbon achieved their optimum values at 54.66% canopy cover. Meanwhile, optimum soil moisture content was observed at 97.43% canopy cover. Coffee productivity was most consistently achieved under moderate to high canopy cover (54.66–79.78%) because this range maintained a balance between light availability and microclimatic stability. Canopy cover was indirectly associated with the physiological capacity and yield components of robusta coffee through its influence on microclimatic conditions. Therefore, coffee agroforestry management should prioritize maintaining a balanced canopy configuration rather than maximizing or minimizing canopy cover.

Keywords: Agroforestry; Canopy cover; Robusta coffee; UAV imagery.