

INTISARI

Ekspansi lahan perkebunan kelapa sawit untuk memenuhi target produksi nasional berpotensi membuka areal baru dengan karakteristik topografi yang bervariasi, termasuk lahan dengan kemiringan lereng curam hingga sangat curam. Penelitian ini bertujuan untuk menganalisis hubungan antara kemiringan lereng dengan karakteristik fisika tanah dan aliran permukaan, serta menyusun arahan konservasi yang tepat berdasarkan hasil analisis tersebut. Penelitian dilakukan di Afdeling II Kebun Sukamaju PTPN VIII, Kabupaten Sukabumi, Jawa Barat. Sebanyak 15 blok mewakili lima kelas kemiringan lereng ditentukan menggunakan metode *proportional random sampling*, kemudian dilakukan pengambilan sampel tanah pada dua kedalaman (0–20 cm dan 20–40 cm). Parameter fisika tanah yang dianalisis meliputi tekstur, kadar lengas, berat volume, berat jenis, porositas, sebaran ukuran pori, kapasitas lapangan, stabilitas agregat, permeabilitas, dan kandungan bahan organik. Estimasi aliran permukaan dihitung menggunakan metode *Soil Conservation Service-Curve Number* (SCS-CN) dengan penyesuaian nilai CN berdasarkan kondisi kelembapan awal tanah (AMC). Hasil penelitian menunjukkan bahwa peningkatan kemiringan lereng berbanding lurus dengan penurunan kualitas fisik tanah, yang ditunjukkan oleh rendahnya porositas, stabilitas agregat, dan kandungan bahan organik, serta meningkatnya berat volume. Nilai koefisien aliran permukaan tertinggi ditemukan pada lahan sangat curam, yang mencerminkan potensi limpasan yang sangat tinggi. Arahan konservasi yang disusun meliputi penerapan *legume cover crop* (LCC) untuk lereng datar, parit cacing untuk lereng landai, bak penampung berundak untuk lereng agak curam, kombinasi teras kontur dan LCC untuk lereng curam, serta teras tapak kuda untuk lereng sangat curam. Penerapan konservasi berbasis kelas lereng ini diharapkan dapat memperbaiki kualitas fisik tanah, menekan aliran permukaan, dan mendukung produktivitas kelapa sawit secara berkelanjutan.

Kata kunci: konservasi tanah, karakteristik fisika tanah, aliran permukaan, kemiringan lereng, kelapa sawit.

ABSTRACT

The expansion of oil palm plantations to meet national production targets has led to the utilization of new areas with varied topographic characteristics, including steep to very steep slopes. This study aims to analyze the relationship between slope gradient, soil physical properties, and surface runoff, and to formulate appropriate soil conservation strategies. The research was conducted in Division II of Sukamaju Plantation, PTPN VIII, Sukabumi Regency, West Java. Fifteen blocks representing five slope classes were selected using proportional random sampling. Soil samples were collected at two depths (0–20 cm and 20–40 cm) and analyzed for texture, moisture content, bulk density, particle density, porosity, pore size distribution, field capacity, aggregate stability, permeability, and organic matter content. Surface runoff was estimated using the Soil Conservation Service-Curve Number (SCS-CN) method, with adjustments based on Antecedent Moisture Condition (AMC). Results indicated that increasing slope gradient was associated with a decline in soil physical quality, marked by reduced porosity, lower aggregate stability, lower organic matter, and increased bulk density. The highest runoff coefficient was recorded on very steep slopes, reflecting high surface runoff potential. Based on these findings, slope-specific conservation strategies were developed: legume cover crops (LCC) for flat areas, field drains for gentle slopes, stepped collection basins for moderately steep slopes, a combination of contour terraces and LCC for steep slopes, and horseshoe terraces for very steep slopes. This tailored conservation approach is expected to enhance soil physical quality, reduce surface runoff, and promote the sustainable productivity of oil palm plantations.

Keywords: soil conservation, soil physical properties, surface runoff, slope gradient, oil palm.